

**Attachment in middle and late childhood.**

**Measurement validation and relation to mental health problems**

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## Summary

Attachment theory is a widely appreciated perspective on the importance of close relationships for human development. Middle and late childhood (8 to 13 years) is one of the least studied age periods in attachment research. Challenges for attachment research in general, and this age period in particular, concern the adequacy of measurement procedures and the influence of attachment on mental health problems.

This dissertation includes cross-sectional data from 150 children (M age 11.7) and 121 parents. Children were interviewed with the Child Attachment Interview (CAI), which is videotaped and coded according to a manual. Both parents and children completed questionnaires including measures of mental health problems, as well as risk and protective factors for mental health problems.

Individual differences in attachment are traditionally conceived of in terms of categories (e.g. secure-insecure). Yet, there are both theoretical and empirical reasons to consider individual differences as being distributed along dimensions. Furthermore, attachment researchers have to a limited extent taken advantage of recent developments in psychometrics, in particular a latent variable approach like Confirmatory Factor Analysis (CFA), to study construct validity. The first paper in this dissertation applies a CFA to the CAI, and thereby examines the construct validity of a continuous conception of the attachment construct in middle and late childhood. In this study, we found evidence for a two-dimensional model comprising the factors Security-Dismissal and Preoccupation-Idealization. Furthermore, we found these factors to maintain the information inherent in the categories, but to add information about subtle differences between individuals. The continuous approach to the attachment construct was applied in the two other papers in this dissertation as well.

A small, yet consistent, association is found between attachment and mental health problems across age groups; insecurity as a risk factor, and security as a protective factor. More complex models are used to understand the role of attachment and other risk and protective factors for mental health problems. The multi-variate risk factor model where attachment, family adversity, and ineffective parenting are considered, alone and in combinations, to influence mental health problems, has been influential. The diathesis-stress model is another influential way of understanding how attachment influences mental health problems. This model is based on a stress-regulatory approach to attachment, and hypothesizes that children with high levels of attachment security have more efficient means

for coping with stress. In contrast, children with low levels of attachment security (i.e. attachment insecurity) have less efficient means. In paper two, we combine these perspectives by hypothesizing attachment as a part of a multi-variate model of family risks, however as being a moderator of the negative effect of the other risk factors on internalizing and externalizing problems. This hypothesis was supported for some, but not all, of the risk factors. Also, there was a dose-response relationship between a cumulative index of risk factors and mental health problems for children with low levels of attachment security, whereas children with high levels of security were unaffected by the accumulation of family risks.

The association between low levels of attachment security (i.e. insecure attachment) and internalizing problems is unquestionable. However, there are children who have more or less internalizing problems than expected, given their level of attachment security. The purpose of paper three is to examine characteristics of these children. We found high levels of difficult temperament (negative emotionality and shyness), as well as family risks, to characterize children with more internalizing problems than expected, given their level of security. Low levels of difficult temperament and family risks, but not positive temperament (activity) and social support from peers, explained less internalizing problems than expected, given the child's level of attachment security.

This dissertation addressed several important topics in attachment research, particularly concerning middle and late childhood. The main findings in this dissertation are:

- Attachment organization, measured with the Child Attachment Interview, may adequately be conceived as a two-dimensional construct, however with one main dimension ranging from security to dismissal
- Attachment security buffers the negative effects of family risk of mental health problems in middle and late childhood.
- Children with more internalizing problems than expected, given their level of attachment security, tend to have difficult temperament and experience family risks.



## **List of papers**

### **Paper 1**

Zachrisson, H.D., Røysamb, E., Oppedal, B. Hauser, S.T. Factor structure of the Child Attachment Interview. *Submitted Attachment and Human Development*

### **Paper 2**

Zachrisson, H.D., Hauser, S.T., Røysamb, E., & Oppedal, B. Attachment as a moderator of family risks in late childhood *Submitted Child Development*

### **Paper 3**

Zachrisson, H.D., Hauser, S.T., & Oppedal, B. Attachment and internalizing problems in late childhood: Exploring deviations. *Submitted Attachment and Human Development*

## 1 Introduction

Attachment theory and research has become a widely appreciated perspective on the importance of close relationships for human development. Despite an impressive track-record, attachment theory faces conceptual and methodological challenges concerning the meaning of attachment beyond infancy, validation of measures, and conceptualizations of attachment, risk, and mental health problems (Thompson & Raikes, 2003). In this doctoral dissertation, I address these challenges through three broad questions, framed within the study of attachment in middle childhood: Does the measurement of attachment in middle childhood actually reflect the attachment construct? What is the role of attachment in more complex models of risk and mental health problems? How should we understand children who have more or less internalizing problems than expected, given their level of attachment security?

### 1.1 Four basic tenets of attachment theory

The papers in this dissertation address issues closely connected to basic tenets of attachment theory, in terms of both the measurement and application of the attachment construct. The attachment construct has been given a variety of meanings, from being used widely synonymous with relationships, to being a technical term denoting certain aspects of intimate relationships, in particular the parent-child relationship (see discussion in Rutter, 1995; Fox, 1995; Grossmann & Grossmann, 1990). In this dissertation I adhere to the latter, referring to attachment as a relationally based stress-regulatory system (Bowlby, 1969; Bowlby, 1973; Bowlby, 1980; Kobak & Sceery, 1988; Kobak & Ferenzgillies, 1995; Kobak et al., 2006). From this perspective, there are a number of basic tenets of attachment theory that apply regardless of the age group studied. First of all, the construct of attachment refers to a *motivational behavioral system* that is activated when the individual feels threatened (Bowlby, 1969). The attachment system motivates the individual to seek protection and comfort from particular persons who are “stronger and wiser”. These persons are referred to as attachment figures. In infancy and childhood, these are usually the parents, in adulthood a spouse.

A second tenet is attachment conceived as an *organizational construct* (Sroufe & Waters, 1977). This means the attachment system motivates the individual to organize goal-corrected behavior, which *function* is to maintain a feeling of security. Thus, it is not behavior in itself

which is important, but the function of the behavior. This means that the attachment construct refers to strategies employed by the individual with the explicit function of eliciting safety and comfort in an interpersonal context. The organizational perspective is crucial in considering how the attachment system influences on behavioral responses.

A third tenet concerns the influence of attachment on affect regulation. Affect was a central concept in Bowlby's writings, as he defined attachment as an "affectional bond". He did however not describe in detail how the term should be understood (Sroufe, 1995). Since then, attachment research on affect regulation has mainly concerned the move from a dyadic to an individual level, the way the infant develops an ability to regulate affect on her own (Sroufe, 1995). However, the role of affect regulation for attachment in adolescence and early adulthood has also received attention, and Kobak and colleagues base their approach to attachment theory on this construct (Kobak & Ferenzgillies, 1995; Kobak et al., 1993; Kobak & Sceery, 1988). Furthermore, affect regulation, "felt security", was addressed as one of the organizing parameters of the organizational perspective on attachment (Sroufe & Waters, 1977). Affective responses to threatening situations are in this perspective seen as part of the attachment system (Cassidy, 1994). Thus, the regulation of affect is used strategically in two ways. First, regulation and display of affect is used goal-corrected in order to obtain a feeling of safety and comfort. This means that a certain display of affect is chosen in order to maximize the likelihood of response from the attachment figure. Second, affect can be regulated in order to maximize a "feeling of security" in situations where this is not provided by the attachment figure. These two aspects of affect regulation are crucial in the conceptualization of individual differences in attachment, and will be addressed further below.

A fourth tenet is the construct of *Internal Working Models* (IWM; Bowlby, 1969). Main and colleagues (1985) defined IWM in a way that has been classical in the literature since; "a set of conscious and/or unconscious rules for the organization of information relevant to attachment and for obtaining or limiting access to that information..." (pp. 66-67). As such, representational models serve a protective function on two levels, incorporating affect-regulation discussed above. First, they organize behavior from an expectation of the physical and psychological protection given by an attachment figure. Second, when the attachment figure does not offer adequate protection or comfort, they maintain a feeling that the individual is loved and protected, contrary to reality. This latter point was inspired by Tulving's (1979) work on memory systems. Bowlby (1980) argued that different kind of

information (episodes, semantic knowledge etc.) is processed by different neural systems. Bowlby's clinical experience was that his patients described their attachment relationships in one way at a general, semantic, level. At the same time they told about episodes that contradicted this, or were lacking memories of episodes of such events. From these clinical experiences, he stated that information relevant to attachment is processed by different memory systems, and that a key to understand the function of representational models is to understand how the individual segregates, omits and disintegrates information at a memory-systems level, in order to maintain a feeling of protection and safety.

These four basic tenets of attachment theory are to a limited extent explicitly addressed by the papers in this dissertation. Nonetheless they form a conceptual background, both for the topics covered below in this section, and for the papers. Specifically, both validation of attachment measures and theories and empirical studies of attachment and mental health, build on these tenets.

### *1.2 The meaning of attachment in middle and late childhood*

The papers in this dissertation focus to a great extent on general attachment theoretical topics, studied in late childhood. Notably, two of the most comprehensive reviews of attachment in middle and late childhood explicitly adhere to a narrow approach to the attachment construct, focusing on the stress-regulatory function of the attachment system (Dwyer, 2005; Mayseless, 2005). This underscores the relevance of the tenets discussed in the previous section, as well as of the theoretical focus of the papers in this dissertation. The focus on general attachment theoretical topics in the papers is to some extent at the expense of age-specific features of attachment in middle and late childhood, although the core of the construct as described above remains (Raikes & Thompson, 2005). These age-specific features will be discussed below. This age period, ranging from 8 to 13 years of age, is the least studied developmental period in attachment research (Greenberg, 1999), perhaps with the exception attachment in middle aged and old people (Main, 1999).

Bowlby (1969) argued that as the child grows beyond infancy, the conditions that activate as well as deactivate the attachment system will change. This is due to several aspects of development which are interrelated; in particular development of cognitive capacities and affect regulation, changes in the social demands and contexts of the child, and the forms of interactions with attachment figures.

Raikes and Thompson (2005) reviewed the major cognitive and affect regulatory developments of relevance for attachment. First of all, between 8 and 13 years, children begin to develop capacity for abstract reasoning, as well as cognitive flexibility. This has implications for the capacity to separate apparent phenomena from underlying causal agents, as well as for the capacity to plan alternative strategies to achieve a goal. Furthermore, memory retention increases, as does the capacity for meta-cognition. The latter has implications for the development of perspective taking. Children in this age group also develop more nuanced conceptions of self and other, and begin to conceive relationships in more complex forms, including ambivalence. Finally, the capacity for internal (in contrast to relational) affect regulation gradually increases.

Taken together, these developments may have profound impact on the child's internal working model. This is both in terms of greater capacity for taking parent's perspectives, consider motivations in contrast to apparent behavior, and to plan a goal-corrected partnership with the parents more smoothly (Mayseless, 2005). Moreover, these maturational changes may also lead to changes in the structure of the internal working models from being relationship-specific, as they are in infancy and preschool age, to being more integrated representations of attachment-relationships, as they are hypothesized to be in adulthood (Verschueren & Marcoen, 1999; Kobak et al., 2005; Raikes & Thompson, 2005). Another point, made by Crittenden (2000a), is that the child may be capable of relating to the parents in new ways, which makes the parents more accessible for providing safety and comfort. However, she points out that these developments may also decrease the confidence in the parents, and contribute to the development of new strategies to handle the insecurity in relation to the parents' role as safety providers.

Exposure to situations activating the attachment system changes with age. Some experiences that activate the attachment system in younger children do not longer have impact. Rather, new experiences common to children in this age group are likely to activate the attachment system (Crittenden, 2000a; Mayseless, 2005). These may include longer separations, for instance going away on school trips, being home alone when ill, or interpersonal conflicts with friends or with the parents. At the same time, the cognitive and emotional developments influence the way in which the attachment system is deactivated. Whereas infants and preschoolers rely on physical proximity as a primary goal of attachment behavior, older children rely more on communication with an attachment figure (Bowlby, 1969). Physical proximity with parents, such as holding hands or sitting on the lap is also

common among distressed school age children, but is to a great extent supplemented and gradually replaced by psychological proximity, i.e. a feeling of the attachment figures as being available and safe (Dwyer, 2005; Shmueli-Goetz et al., 2007). Even a phone call from parents may deactivate the attachment system (Mayseless, 2005).

The study of attachment in middle and late childhood can either focus on the uniqueness of this age period or on the universality of basic tenets in attachment theory across age-groups. In this dissertation I take the latter approach, although the attachment measure used, the Child Attachment Interview (Target et al., 2003; Shmueli-Goetz et al., 2008), is carefully designed in all respects to accommodate this particular age group. Thus, from a conceptual and measurement point of view, the uniqueness of the manifestation of the attachment construct in this age group is implied in this dissertation. Furthermore, the papers in this dissertation relate to the current literature on attachment in middle and late childhood in several ways. First, the invention of new measures on attachment in this age group in particular has caused concern about the conceptualization of individual differences in attachment in middle and late childhood (Raikes & Thompson, 2005), about lack of validation studies (Thompson & Raikes, 2003), and about strategies for validation of attachment measures in this age group (Laible, 2005; Raikes & Thompson, 2005). Second, there is a scarcity of studies of attachment and mental health problems in this age group, and in particular of studies including complex theory driven models of this relationship (Kobak et al., 2006). Consequently, although the papers in this dissertation focus on general attachment-theoretical topics, they may also add specifically to the literature on attachment in middle and late childhood.

### *1.3 Conceptualization of individual differences: Categories and dimensions*

In this dissertation, I take an unconventional approach to the empirical use of the attachment construct, as being continuously, rather than categorically structured. The categorization of individual differences in attachment dates back to the work of Ainsworth and colleagues (1978), on infant attachment. Despite the gradual changes in ways attachment is expressed throughout development, the literature in general holds individual differences in middle childhood to be organized in the same way as in other age groups (Dwyer, 2005). The categories (labeled attachment patterns in children) are intended to reflect qualitative differences in the internal working models. Two important distinctions are made in the categorization of attachment. The first differentiates Type B, labeled “secure” from the other

three patterns labeled “insecure”. This distinction has been maintained throughout the attachment literature as being crucial for the developmental consequences of attachment: it is hypothesized that the securely attached do best. The other distinction differentiates the organized patterns (Type A, Type B, and Type C) from the disorganized Type D; the disorganized are hypothesized to do worst.

The secure pattern (Type B) is thought to reflect representations of the attachment figures as being predictable and available. The child has accurate and undistorted affective and cognitive information about the availability of the attachment figures, and the capacity to provide safety and comfort. The organized insecure patterns (Type A; dismissing, and Type C: preoccupied) are thought to reflect representations of the attachment figures as being unpredictable and/or unavailable, and includes strategies to cope with this experience. The insecure dismissing category (Type A) refers to representations which idealize or dismiss attachment figures in order to avoid experiences of them being rejecting and unavailable. The insecure preoccupied category (Type C) refers to representations which angrily or passively blame the attachment figures for their shortcomings. These, in many ways inverse, strategies both serve the function of coping with insecurity through attempting to maintain a feeling of safety and protection from the attachment figures (Crittenden, 1999). A fourth category, unresolved/disorganized (Type D; Main & Solomon, 1990), refers to a breakdown of the attachment system. This category implies that the child is unable to organize a consistent strategy which could lead to achievement of experienced safety and comfort from his or her parents (Main & Solomon, 1990; Lyons-Ruth & Jacobvitz, 1999).

Attachment patterns do not represent naturally given categories. In fact, the categorical structure of the attachment construct has been questioned by several attachment researchers (e.g. Cummings, 1990; Kobak et al., 1993; Roisman et al., 2007; Fraley & Spieker, 2003a), suggesting various conceptualizations of attachment as continuously<sup>1</sup> distribute. A continuous approach to individual differences in attachment is fundamentally different from a categorical. Whereas the latter conceives individual differences as a matter of kind, the former conceives differences as a matter of degree (Waller & Meehl, 1998). These conceptualizations have been partly theoretically, partly empirically based. Cummings (1990) points to four arguments for a continuous approach to attachment. First, a dimensional approach provides more subtle information about differences between individuals, which may be lost when individuals are

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<sup>1</sup> The concept “continuous” refers in this thesis to the quantitative distribution of a phenomenon (differences in degree). The concept “dimension” is used synonymously, but implies a structure of more than one dimension.

lumped together in broad categories. That is, a dimensional approach ideally maintains the information provided by the categories, and adds information about subtle individual differences. Second, individual's true attachment organization may be on the borderline between categories, leading to potential errors in classifications. Third, normal and very deviant attachment organizations would be represented by variations along the same dimension, enhancing statistical comparisons. Fourth, statistical power may be substantially increased by employing dimensional compared to categorical scores. This is important because findings may be undiscovered due to the relatively small samples commonly applied in attachment research.

From an empirical point of view, the structure of the attachment construct has been addressed by Fraley and colleagues (Fraley & Spieker, 2003a; Roisman et al., 2007). They employ Meehl's taxometric technique (1995; Waller & Meehl, 1998), to test the dimensional (matter of degree) versus the categorical (matter of kind) structure of latent phenomena without being constrained by prior assumptions of either of the two. These studies find individual differences in both infant attachment measured by the Strange Situation (Ainsworth et al., 1978), and adult attachment measured with the Adult Attachment Interview (Hesse, 1999) to vary in degree, rather than in kind (Roisman et al., 2007; Fraley & Spieker, 2003a).

Assuming that the attachment categories capture "prototypes" of variation along one or more dimensions (Fraley & Spieker, 2003b), several conceptualizations of attachment dimensions have been made. Cummings (1990) suggests a uni-dimensional model where individual differences in attachment are conceptualized as levels of felt security. Kobak and colleagues (1993) suggested another continuous approach, developed a Q-sort procedure for scoring the AAI, rating individuals along two dimensions, the first ranging from attachment security to insecurity/anxiety, the second from hyperactivating insecurity to deactivating insecurity. Fraley and Spieker (2003a) conducted empirical exploration, suggesting two underlying dimensions of infant attachment "Proximity-Seeking versus Avoidant Strategies", and "Angry and Resistant Strategies". The first dimension refers to the degree to which an infant seeks proximity with his or her caregiver; the second addresses the degree to which infants display overt conflict and anger with their caregiver. Using similar analyses, strong evidence for a secure-dismissing dimension underlying variation in AAI ratings was also found (Roisman et al., 2007).

Inspired by these theoretical and empirical considerations, I take a continuous approach to the attachment construct in this dissertation. This is explicitly addressed in a validation study



in paper 1, and the results from this study form the basis for the use of attachment as continuously distributed in papers two and three. It is important to note that when I in the following use the term of “insecure attachment” this refers to the category, and should be considered equivalent with the insecure end of the attachment security continuum.

#### *1.4 Testing construct validity in attachment research*

The first paper in this dissertation introduces a latent variable approach to validation of the Child Attachment Interview. Attachment researchers have from the beginning been concerned with validation issues (Ainsworth et al., 1978), and there is continuing focus on the need for psychometric rigor (Laible, 2005; Carlson et al., 2004; Solomon & George, 1999; Thompson & Raikes, 2003). Validation issues with regard to new attachment measures for middle childhood have been discussed both by Dwyer (2005) and Laible (2005). Both of these authors highlight comparison with a “gold standard” measure as the most important strategy for validating a new measure. A psychometric line of reasoning would not consider comparisons with “gold standard assessment” to be an optimal way of studying validity (Cronbach & Meehl, 1955). This is because every measure is affected by random as well as systematic measurement error (John & Benet-Martinez, 2000). The idea of “gold standard” comparison is based on an assumption that one specific assessment is free of measurement error.

An alternative approach is suggested by Raikes and Thompson (2005), pointing to convergent and discriminant validity, in terms of correlations and lack thereof with other measures. As these authors themselves point out, the value of this correlational approach is limited by the specificity of the theoretical predictions tested. For instance, how large can the correlation with IQ be before we say that an attachment measure is influenced by IQ? And, is it reasonable to argue that IQ should be completely unrelated to attachment? How small should the correlation with parenting behavior be before we consider the two to be unrelated, compromising validity? Is it theoretical grounding to expect such a correlation? These are the types of theoretical and practical challenges we are faced with relying on a convergent/discriminant validity paradigm.

Rather, I prefer to take a psychometric approach to validation, resting on the assumption that validity is not a property of the test or measure *pr. se.*, but of the interpretation and meaning of the test (Cronbach, 1971). Following this, Messick (1995) proposes an integrated

view of construct validity. He basically argues that all aspects of validity and reliability contribute to an adequate interpretation of the assessment score within a context. In this view construct validity is based on an integration of all evidence supporting a certain interpretation of the test score, and is therefore an evolving process (Messick, 1995). Classical test theory presumed a random error to measurement (Lord & Novick, 1968). The integrated view presumes that not only random, but also systematic errors (error related to the particular measure used) hamper the interpretation of measurement scores. Systematic error are both related to *construct underrepresentation*, that the measure is too narrow to include important aspects of the construct, and to *construct-irrelevant variance*, that the measure is too broad, and includes other distinct constructs as well (Messick, 1995).

Messick (1995) points to six aspects of construct validity: *the content aspect* (evidence of content relevance), *the substantive aspect* (theoretical rational for observed consistencies in test score), *the structural aspect* (consistency between expected and observed structure of the construct), *the generalizability aspect* (generalizability across raters, populations, and settings), *the external aspect* (convergent and discriminant evidence), and *the consequential aspect* (valid use of the assessment). These six aspects should be conceived as a heuristic for test validation, rather than a checklist. John and Benet-Martínez (2000) expand on the structural aspect by suggesting a design for model testing using Structural Equation Modeling (SEM) for testing Confirmatory Factor Analysis (CFA; Bollen, 1989).

The central idea behind testing a construct with a measurement model such as CFA is to ensure that our hypothesis about the meaning of the structure in the data (our construct) reflects the observed structure in the data. If this is not the case, then we must question whether the construct can be interpreted as a meaningful representation of covariance in our data. As a model for construct validation, a latent variable approach supplements this approach in several ways. First, it allows for specification and testing of a measurement model (also competing models) based on the theoretical structure of a given construct. Arguing that attachment measures reflecting the attachment construct has previously been based on theory and interpretation. Second, the extent to which variance in each of the subscales reflects variance in the attachment construct can be determined. Such partitioning of variance has not, until now, been considered in attachment validation studies. However, since there is ample conceptualization of the importance of each subscale and explication of its meaning with respect to the attachment construct, we are now in an excellent position to specify and empirically test their interrelations.

Following these considerations, the study in paper one is, to our knowledge, the first attempt to apply a latent variable approach to validation of an interview-based attachment measure. This is important because the majority of validation studies in psychometric journals such as *Psychological assessment* take this approach. Attachment research has therefore to some extent been out-dated, relying on comparisons with gold standards and convergent/discriminant correlations. Importantly, as evident from Messick's work (1989; 1995), the latter is a useful aspect of validation, however weak when used in isolation.

### 1.5 Attachment and mental health problems

The second and third papers in this dissertation address the relationship between attachment and mental health problems. Attachment theory concerns normal as well as abnormal development (Sroufe et al., 1999). In fact, Bowlby's first work on attachment theory addressed attachment and externalizing problems in early adolescence (Bowlby, 1944). Attachment theorists have subsequently suggested different models of how attachment influences mental health problems, and this literature has been thoroughly reviewed by Greenberg (1999) and more recently by Kobak and colleagues (2006). This section is a synthesis and extension of the theoretical models reviewed by these authors. There are relatively few studies on attachment and mental health problems in middle and late childhood, but these will be discussed as examples of theoretical models where appropriate. I will not include the diagnostic group of attachment disorders, as these to a limited extent are based on attachment theory.

Models of attachment and mental health problems rest on the assumption that insecure attachment is a *risk factor*, and that secure attachment is a *protective factor*. The term risk factor is commonly used in research on mental health problems as a factor increasing the probability for a certain outcome. There is an important distinction between a terminology in which the term is restricted to imply a relationship in which the risk factor temporally precedes the outcome, specifying when a causal relationship is evident (Kraemer et al., 1997), and a looser use of the term as a factor related to the outcome, also cross-sectionally, implying the possibility of a causal relationship (e.g. Sroufe, 2000). In this dissertation I use the term in a loose way, referring to potentially causal relationships, although being in an empirical sense only correlates (Kraemer et al., 1997). Thus, in both the following review and in the papers,

attachment is considered a risk factor for mental health problems in terms of being a correlate with potentially causal implications.

Models of attachment and mental health problems can be divided into two broad groups, the main-effect models and a number of more complex models. The basic assumption of a main effect model is that insecure attachment in general increases the risk for unfavorable outcomes. Indeed, reviews provide vast empirical evidence that insecure attachment *in general* to some extent is associated with mental health problems, and most so in samples exposed to high social risk (Greenberg, 1999; Kobak et al., 2006). However, the effect sizes are small, and the assumption that insecure attachment alone leads to mental health problems is considered outdated by these reviews. These simple linear associations are therefore of limited theoretical interest because attachment insecurity is widely common among children without any mental health problems (Kobak et al., 2006). Nonetheless, many of the more complex models of attachment and mental health problems are based on a main effect assumption, but aims at increasing the specificity of the models. Initially, I will therefore review theoretical propositions for how attachment insecurity may be directly related to the two broad types of mental health problems in childhood; externalizing (conduct problems, hyperactivity/ inattentiveness problems etc) and internalizing problems (symptoms of anxiety and depression).

Most theorists view attachment as part of more complex models involving a variety of other risk factors as well (e.g. Cummings & Cicchetti, 1990; Greenberg, 1999; Sroufe et al., 1999; Kobak et al., 2006). This is important because the conceptual clarity and theoretical complexity of Bowlby's work (1969; 1973; 1980) and subsequent elaborations (e.g. Sroufe & Waters, 1977; Sroufe et al., 1999; Greenberg, 1999) needs to be embedded in empirical on research attachment and mental health (Thompson & Raikes, 2003). Based on the review by Kobak and colleagues (2006), I will discuss four types of complex models of attachment and mental health problems; cumulative risk models, mediation models, early experience models, and diathesis-stress models.

#### 1.5.1. Main effect models

Externalizing problems have been linked to attachment insecurity in a large number of studies (Guttman-Steinmetz & Crowell, 2006), along with a number of hypotheses about this link. For instance, externalizing symptoms have been hypothesized to be a direct expression of distress in insecure adolescents (Allen & Land, 1999), or a way of keeping focus away

from feelings of distress (Crittenden, 1995). Alternatively, externalizing problems may be interpreted as hostility and anger towards the parents (Allen et al., 1998; McElhaney et al., 2006) or to be “extreme” forms of attachment behavior, intended to force parents to attend to the child’s attachment needs or even as a call for help (Allen et al., 1998; Kobak et al., 1993; Greenberg et al., 1993). From a theoretical point of view, externalizing problems have primarily been associated with the dismissing and disorganized attachment patterns (Guttmann-Steinmetz & Crowell, 2006).

A number of studies have examined the association between attachment and externalizing problems in middle and late childhood. The effect sizes reported are generally in the small range (equal to an  $r$  of .20 or .30). Some studies find association between insecure attachment in general, and externalizing problems (Cohn, 1990; Easterbrooks et al., 1993). Other studies find similar effects, but specify subtype of insecurity (Solomon et al., 1995; Moss et al., 1998; Moss et al., 1996; Moss et al., 2006). Taken together, these studies find all insecure attachment patterns to be associated with externalizing problems. Yet, the association between attachment insecurity and externalizing symptoms is not consistent throughout the literature. Verschueren and Marconen (1999) did not find any associations between externalizing problems and insecure attachment in 5 year olds from middle-class families.

Internalizing problems have also received attention. Anxiety is a fundamental aspect of attachment theory (Greenberg, 1999), and a probable outcome when stress becomes so prominent that the attachment system fails to provide the child with a feeling of safety and protection (Bowlby, 1973). Children with insecure attachment representations are in general prone to become anxious because of their vigilance with the availability of the attachment figures, as well as their feelings of emptiness and emotional isolation (Crittenden, 1995; Warren et al., 1997; Bar-Haim et al., 2007). Bowlby (1980) considered depression to be a potential consequence of separation or loss of an attachment figure. More recently, several theorists have argued that children with insecure attachment representations are at risk for depression because they are likely to experience themselves as unworthy of love, have diminished self-esteem, and in general less feelings of security (e.g. Cummings & Cicchetti, 1990; Graham & Easterbrooks, 2000). Several authors have argued that that internalizing problems are most strongly associated with the preoccupied (i.e. ambivalent) attachment pattern (Warren et al., 1997; Bar-Haim et al., 2007; Cole-Detke & Kobak, 1996), because of the explicit vigilant and introvert quality of this attachment pattern. In contrast, Crittenden

(1995) has argued that the emotional emptiness associated with the dismissive pattern also may lead to internalizing problems.

A number of studies of attachment and internalizing problems were conducted by Moss and colleagues (1996; 1998; 2004; 2006), with somewhat different results. Moss and colleagues (1996) found no association between attachment and internalizing problems in a small sample of diverse SES background. However, they found only controlling (i.e. disorganized) attachment in association with internalizing problems, after adjusting for other family risks (Moss et al., 1998). In another study, Moss and colleagues (2006) found avoidant (i.e. dismissing) and controlling (i.e. disorganized) attachment measured at age six to be associated with internalizing problems two years later. Graham and Easterbrooks (2000) found attachment insecurity in general, as well as disorganization in particular, to be associated with internalizing problems. This study also tests a more complex model which I will refer to below.

#### 1.5.2. Cumulative risk models

Cumulative risk models rests on the assumption that the more risks the child is exposed to, the greater the probability for unfavorable outcomes (Sameroff, 2000; Sameroff et al., 1998). Thus, it is the number of risks, rather than the specific types of risks, which has the greatest impact. In attachment research, the cumulative risk model has primarily been forwarded by Greenberg (1999). He suggested an ecological risk-model inspired by Bronfenbrenner (1979), involving the domains of *child characteristics, attachment, parenting, and family ecology*. Empirical applications of this model in preschool children found a dose-response relationship between the number of risk domains the child is exposed to, and mental health problems (Greenberg et al., 1991; Greenberg et al., 2001; Keller et al., 2005). Yet, these studies did not find any of the risk factors to be necessary nor sufficient for adverse outcomes.

Thompson and Raikes (2003) pointed out that cumulative risk models have important implications for the study of attachment and mental health, both in terms of their heuristic value of being general indexes of risks, and by providing a way of addressing multiple risk factors in small samples where statistical power is limited. They also pointed to the limitations of these models, neglecting the fact that risk factors vary in strength or operate on different conceptual level and have different conceptual meaning (Thompson & Raikes, 2003; Greenberg, 1999). Thompson and Raikes (2003) therefore underscored the importance of studying risk factors both alone and in combination with others.

### 1.5.3. Mediation models

Mediation models refer to examinations of an intervening variable or mechanism explaining the relationship between a predictor and an outcome (Baron & Kenny, 1986). This means that theoretical propositions explaining the mechanisms linking attachment and mental health problems are mediator models. For instance, Greenberg (1999) summarized two mediational propositions linking attachment with mental health outcomes, each of them having received some empirical support, though not in middle childhood. The first of these holds that children with insecure attachment organize their social relationships based on internal working models characterized by anger, fear and mistrust. This, in turn, leads to maladaptive social responses and consequently to mental health problems. This view is based on studies finding negative attributional biases in children with insecure attachment (Greenberg, 1999). Second, insecure attachment leads to maladaptive affect regulation, which in turn disposes for mental health problems. The perhaps most comprehensive formulation of this view was presented by Kobak and colleagues (Kobak & Ferenzgillies, 1995; Kobak et al., 1993; Kobak & Sceery, 1988; Cole-Detke & Kobak, 1996). These authors argued that attachment patterns are inherently patterns of affect regulation. The dismissing pattern is characterized by an over-regulation of affect, and the preoccupied pattern by an under-regulation of affect. Consequently, the children with the dismissing pattern would be disposed for neglecting or minimizing distress-cues like for instance through substance abuse, whereas children with the preoccupied pattern would tend to exaggerate distress-cues, for instance through depression. This hypothesis was supported by Rosenstein and Horowitz (1996) and Allen and colleagues (1998), who also pointed to conduct disorders as clinical symptoms that minimize the focus on own negative affect.

Another mediational model has been suggested by Fonagy and colleagues (2002). These authors argue that one of the central developmental tasks of the attachment relationship is to develop the capacity to mentalize, i.e. perceive self and other in terms of mental states (feelings, beliefs, intentions, desires). Mentalization also refers to the capacity to reason about own and other's behavior in terms of mental states. Furthermore, the authors argue that the development of this capacity is determined by the quality of the attachment relationship. It is thereby closely connected to development of affect regulation, to the ability to distinguish between appearance and reality, and to the achievement more meaningful interpersonal relationships. As such, this model conceives mentalization as an intervening variable which

explains, in part, the association between attachment and mental health problems (Fonagy et al., 2002).

An alternative type of meditational models would view attachment as an intervening variable explaining the relationship between a predictor and the outcome. I am not aware of any such studies. An important limitation with regard to meditational models of attachment and mental health is that the direct association between the two in general is moderate to small. Because of the sample size needed to detect mediation effects with small effect sizes, such studies are challenging (Fritz & MacKinnon, 2007). Importantly, as will be discussed below, a small or moderate effects size of the direct association does not mean that there are not particular circumstances in which attachment is of great importance to mental health.

#### 1.5.4. Early experience models

Early experience models hold that early attachment experiences influence later mental health problems (Kobak et al., 2006). The predictive value of early attachment is an important topic in attachment research, and may be viewed in two ways. The first of these is closely related to the presumed stability of attachment patterns over time. Because the empirical work in this dissertation is based on cross-sectional data, I have not addressed this topic explicitly above. However, I have discussed theoretical models of stability and change in attachment patterns, along with available empirical evidence, elsewhere (Zachrisson, 2005). Briefly stated, attachment theory (e.g. Bowlby, 1969; Main et al., 1985) assumes that IWM are quite stable over time, and increasingly so with age. Available evidence suggests that stability is most likely when the context is stable, and that changes may also happen due to maturation, unrelated to context (Zachrisson, 2005). Based on these findings, the idea that early IWM remain stable and therefore lead to mental health problems is, from my point of view, not strongly supported. However, Lyons-Ruth and colleagues (1997) found that disorganized infant attachment predicted externalizing problems at 7 years of age, and avoidant infant attachment to predict internalizing problems. This study did not control for attachment at age 7 or contextual determinants of attachment or mental health problems during development.

The second view on this topic suggests that there is an effect of early experience above and beyond the effect of concurrent attachment status. This view is consistent with an innovative meta-analysis by Fraley (2002) in which he tested the different assumptions about stability of attachment. Fraley found a combination of early attachment and concurrent contextual influence to have the greatest explanatory power in existing longitudinal data. Yet, this does



not necessarily mean that early attachment contributes to later mental health problems. In fact, most longitudinal studies of attachment and mental health do not control for concurrent attachment status (Kobak et al., 2006).

#### 1.5.5. Diathesis-stress models

Diathesis-stress models are from a theoretical point of view based on a stress-regulatory approach to the attachment construct, discussed above (Bowlby, 1969; Kobak et al., 2006). This model proposes that an underlying vulnerability (diathesis) influences mental health problems only under the conditions of stress, caused by various risk factors (e.g. Sroufe, 1997). When children are exposed to low levels of risk, the status of attachment security or insecurity is of minor importance for mental health. This is because the attachment system will be less activated, and mental health problems also are less likely. When children are exposed to risk factors, those with secure attachment representations are hypothesized to be more resilient, whereas those with insecure attachment representations are considered vulnerable (Kobak et al., 2006). Children with secure attachment will have more efficient and adaptive strategies to cope with the stress in a way which does not lead to externalizing problems. In contrast, children with insecure attachment have less flexible and efficient ways to handle the stress, which may lead to mental health problems. The only example of a diathesis-stress model of attachment and mental health problems in middle childhood is the findings by Graham and Easterbrooks (2000). They found attachment security to buffer the negative influence of economic hardship on depressive symptoms.

I view the diathesis-stress model to be the most adequate model for understanding how attachment is related to mental health problems. This is because it's explicit grounding in the stress-regulatory approach to attachment. Paper 2 is an integration of a diathesis-stress model and Greenberg's (1999) cumulative model presented above.

#### 1.5.6. Does security always equal adaptation?

Attachment theory in general assumes, as mentioned above, that insecure attachment represents a risk for mental health problems. Security, on the other hand, is considered the most favorable pattern, in terms of being a protective factor under stressful life circumstances. However, some attachment theorists note that insecure attachment might be considered a favorable adaptation under some circumstances (Simpson, 1999; Greenberg et al., 1993; Belsky, 1999; Hinde & Stevenson-Hinde, 1990). Crittenden (2000b) extends this argument,

claiming that “security” is one possible adaptation in safe conditions, but neither normative in all populations, nor desirable under all circumstances. Crittenden’s interpretation of the function of attachment strategies highlights their adaptive and protective quality. She argues that the relationship between attachment and psychopathology is dependent on the success of adaptation to individual and cultural circumstances (Crittenden, 1999). From this perspective attachment cannot be considered as a *static* risk factor to be added to other factors. Attachment strategies are the child’s attempt to cope with certain life-circumstances, and must therefore be considered in a *dynamic relationship* with other factors. Greenberg (1999) pointed out that risks might appear on all levels of the ecological systems. Whether attachment security is protective, depends upon its adaptability to challenges met at different ecological levels. Mental health problems should as such be considered a result of continuous interaction between risk- and protective factors (Sroufe, 1997). Maladaptation to any level of system, not only in the attachment relationship between mother and child, might therefore dispose for development of mental health problems. For instance, secure attachment might be a risk factor in the exposure to dangers outside the family or the parent-child dyad. This is exemplified by Crittenden (2000). She points out that attachment patterns found in both normative and clinical populations differ considerably between cultures and sub-cultures. For instance, she argues that growing up in a dangerous inner-city neighborhood, or with seven older brothers in a poor rural area, might perhaps be safer and easier if violence, unpredictability or emotional distancing is handled with adaptive attachment strategies, i.e. the insecure ones that serve a protective function under such circumstances. On the other hand, growing up in an environment without particular dangers, and with predictable and open communication about feelings facilitate secure strategies. This can be hypothesized to be a partial explanation of the proportion of secure children in the clinical populations reviewed above. It can also be hypothesized to explain the relatively weak association between attachment and mental health problems: it is not the attachment pattern *pr se*, but it’s interaction and constellation with other factors on all ecological levels that constitute a risk.

These speculations are challenging but important, as they question core assumptions of attachment research. Empirical investigation of this position may require methodological creativity, including person-oriented methods (Bergman & Magnusson, 1997) and other approaches exploring the variety in outcomes (Hauser et al., 2006). Paper 3 is a step in this direction, inspired by methods from resilience research focusing on unusual outcomes.

### *1.6. Aims*

The aim of this doctoral dissertation is to contribute to attachment research, specifically in middle and late childhood, within the areas of validation and attachment in relation to mental health. Common to the three papers in this dissertation is the use of the Child Attachment Interview, and the conceptualization of individual differences in attachment being continuously, rather than categorically distributed. Subordinately, I address three specific aims:

- 1) To specify and test a model for a continuous conceptualization of individual differences in attachment, measured with the Child Attachment Interview, and to test it within a latent variable framework by means of Confirmatory Factor Analysis.
- 2) To examine a diathesis-stress model of attachment and mental health problems, by testing the moderating effect of attachment on the association between family risk factors and externalizing and internalizing problems, respectively.
- 3) To explore characteristics of children with more or less internalizing problems than expected, given their level of attachment security.

## 2 Materials

### 2.1 *Participants and procedure*

Data for this study was provided by the Youth, Culture, and Competence Study (YCC), carried out by the Norwegian Institute of Public Health. The aim of the YCC is to examine the role of ethnicity and migration in developmental pathways from risk to adaptation or to mental health problems.

In the pilot study (carried out in 2005), we approached all schools in Bergen, and asked for their collaboration with the study, but only a few schools accepted. In the schools that were willing to participate, all immigrant students in 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> grade and an equal number ethnic Norwegians were invited to participate through a letter sent home to them from the schools. The children and their mothers were invited in groups to the Faculty of Psychology at the University of Bergen after work hours. In a first session they completed questionnaires under guidance of research assistants. In a second session the children and their parents were invited individually to participate in interviews. The interviews were conducted by me or by interviewers trained and supervised by me. Twenty-seven children and parents participated in the pilot study. The pilot study laid the ground for revisions of recruitment procedures, questionnaires, interview process and procedures for data collection. The pilot data are included in this study along with data from the main study.

For the purpose of the main study we targeted all students in 5<sup>th</sup>, 6<sup>th</sup>, and 7<sup>th</sup> grade in five selected schools with the highest density of immigrant children in Bergen. Information about the YCC and an invitation to participate was sent home with children from their local schools, and teachers were in charge of collecting the consent forms from parents. Information material was now available in a number of different languages to accommodate the needs of immigrant groups. Data collection with the children was carried out during school classes, while parents were invited to their children's schools after work hours to fill in questionnaires group-wise. Trained research assistants were present during these sessions. A total of 496 children were invited to participate. Of these 333 (67%) accepted to participate. All of these children were invited to respond to the Child Attachment Interview, and 136 (27% of the targeted population) accepted.

A total number of 163 children were interviewed with the CAI, including the pilot data. Of these, 13 interviews could not be used. This was in part due to technical problems with the

recorder etc; in part because some children with immigrant background were considered by the coders (see below) insufficiently fluent in Norwegian to respond adequately. The total number of children with coded interviews were, including the pilot data, 150 (60% girls) of 9-13 years of age ( $M = 11.7$  years,  $SD = 1.3$  years). Paper one is based on this complete data set. Paper two and paper three are based on those children who completed the CAI and the questionnaire, and whose parent(s) also completed the questionnaire. This includes 121 children (60% girls), aged 9-13 ( $M: 11.8$ ,  $SD: 1.1$ ), their mother (77%), their father (21%), or both mother and father together (2%). The attrition and sample size is illustrated in Figure 2.1.

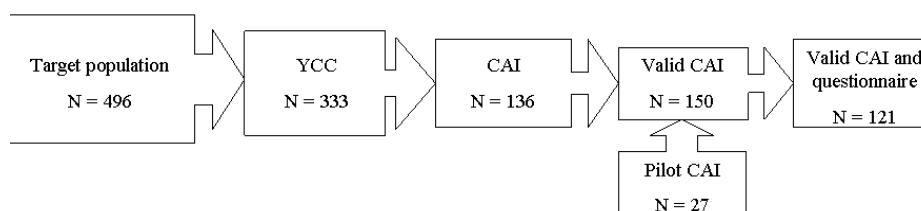


Figure 2.1. Flowchart illustrating the attrition from target population to study samples. Abbreviations are: YCC = Youth, Culture, and Competence Study; CAI = Child Attachment Interview.

Forty-nine children with valid Child Attachment Interviews (CAI) reported national background other than Norwegian (12 from Europe/USA, 24 from the Middle East/Central Asia, 5 from East Asia, 6 from Latin America, and 1 from West Africa). Thirty-seven children with valid CAI and valid parental questionnaire reported likewise (11 from Europe/USA, 19 from the Middle East/Central Asia, 3 from East Asia, 3 from Latin America, and 1 from West Africa)<sup>2</sup>.

The highest level of education for either of the parents was a degree beyond senior high school (>12 years of schooling) for 88 (58%) children, senior high school for 13 (8.5%)

<sup>2</sup> Importantly, although the YCC targets immigrant groups, I do not take a cross-cultural/immigrant perspective in this dissertation. I do however add immigrant status as covariate in papers two and three. For descriptive purposes, comparisons of mean values of the immigrant group versus the Norwegian group on target variables are included in Appendix 1. Furthermore, I do not examine gender differences in this dissertation, but adjust for gender as a covariate in papers two and three. I therefore also include comparisons of mean values for boys and girls in Appendix 1, together with a brief discussion of the implications of gender differences for this dissertation.

children, and secondary school (9 years) for 9 (6%) children. Information about parents' level of education was not available for 40 of the children. Compared to those who participated in the YCC but not in the interview, there was a higher proportion of girls ( $\chi^2(1) = 4.92, p < .05$ ) and children with immigrant background ( $\chi^2(1) = 4.42, p < .05$ ). There were no differences in perceived economic hardship in the family, indicative of socio-economic status, based on child report. Furthermore, there was no difference in the mean level of internalizing problems ( $t[222] = -1.21, ns$ ) between children participating in YCC but not in the interview (M: 1.41, SD: 1.80) and those participating in the CAI (M: 1.73, SD: 1.96). There was, however, a higher level of externalizing problems ( $t[222] = -2.06, p < .05$ ) among children participating in the CAI (M: 0.34, SD: 0.30) than among those who did not (M: 0.25, SD: 0.30).

The children filled out questionnaires during school classes, with research assistants present. Parents were invited to complete a questionnaire at school during evening time with research assistants present, or had questionnaires mailed home. Interviews with the child took place either during school time or after school. As in wave one, interviewers were trained and supervised by the first author. Parents gave written informed consent on behalf of the children, and the study was approved by the Data Inspectorate and the National Committees for Regional Ethics in Norway ([www.etikk.no/English](http://www.etikk.no/English)).

## 2.2. Measures

Measures used in this dissertation comprise an interview and questionnaires completed by the parents and the children.

### 2.2.1. Attachment (Papers 1, 2, and 3)

*The Child Attachment Interview* (CAI; Shmueli-Goetz et al., 2004; Shmueli-Goetz et al., 2008; Target et al., 2003) is inspired by the Adult Attachment Interview (see Hesse, 1999, for review), but designed to examine the child's (aged 7 to 13) representations of her or his current attachment relationships. Similar to the AAI, it consists of a semi-structured interview protocol and a manual for analyzing the interview. The interview takes about 30 minutes in which children (aged 7 to 13) are asked about attachment related experiences with attachment figures. The interview is semi-structured in the sense that the protocol specifies initial questions within each theme addressed, and specifies the structure of the follow-up questions. The content of the follow-up questions is however adjusted to each child's individual history.

The interview protocol is directed toward general (semantic) and specific (episodic) descriptions of the relationships with attachment figures. Briefly summarized, the following issues are addressed: 1) Who the child lives with; 2) Three words to describe one self, followed by probing for examples of each of these words; 3) Three words to describe the relationship with the child's mother, followed by probing for examples of each of these words; 4) Three words to describe the relationship with the child's mother, followed by probing for examples of each of these words; 5) Situations where the child is sad, hurt, ill etc., emphasizing examples involving the parents; 6) Separation from parents; 7) Loss of someone close. The interview is videotaped and subsequently transcribed verbatim for scoring. The interview was translated into Norwegian by Stine Ericson (Cand. Psychol.), Brit Oppedal (PhD), and me. Some questions at the end of the interview about relationship with teachers were added.

The coding of the transcript is based on the discourse quality and coherence of the child's verbal responses according to the CAI manual (Shmueli-Goetz et al., 2004). In addition, reading of the transcript is assisted by the video to enhance comprehension. The video is also intended to provide non-verbal information to be included in the coding, yet this aspect is currently not sufficiently developed or validated. The interview is scored by rating the child's responses on eleven subscales, each rated from 1-9 (low through high), with anchor-point descriptions of discourse quality for every uneven number. These subscales are selected to cover the main aspects of the attachment construct. Most of the subscales are based on the AAI coding manual (Main & Goldwyn, 1984), some are in addition influenced by other development in attachment theory. The CAI subscales are: 1) Emotional openness: The degree to which a range of emotions are described appropriately. This subscale is based on Sroufe and Fleeson (1986) identifying emotional openness a marker of attachment security. 2) Balance of references: The degree to which references to attachment figures are balanced with regard to positive and negative general descriptions. This subscale draws on experience from the AAI, where balance is indicative of attachment security. 3) Use of examples: The degree to which examples are frequent, easily elicited and adequate. The ability to substantiate general descriptions with coherent examples is considered a key aspect of attachment security (Bowlby, 1973; Main & Goldwyn, 1984). 4 and 5) Preoccupied anger with respect to mother and father: The degree to which anger directed towards attachment figures is re-lived in the interview, and the interviewer is involved in this. These subscales are based on the AAI. 6 and 7) Idealization with respect to mother and father: The degree to which positive descriptions of

attachment figures is adequately justified with examples. These subscales are based on the AAI. 8 and 9) Dismissal with respect to mother and father: The degree to which attachment figures or attachment experiences are derogated or dismissed. These subscales are based on the AAI. 10) Resolution of conflicts: The degree to which conflicts with attachment figures are resolved. This subscale is based on work of Oppenheim and colleagues (1997). 11) Overall coherence of discourse, which is based on the scores of “Idealization”, “Preoccupied anger”, “Dismissal”, and “Use of examples”, combined with a consideration of the overall coherence of the child’s narrative, and a consideration of the child’s reflective functioning (Fonagy et al., 2002). The coherence subscale is mainly a summary of other subscales, with some added global interpretations.

After rating the subscales, the interview is according to the manual assigned to one of the four attachment categories; secure, dismissing, preoccupied, disorganized. Assignment to the three former categories is to a great extent based on cut-off points on the rating scales, combined with an overall judgment of the interview. The secure category (Type B) is reflected in the CAI through coherent discourse where good and bad experiences with the caregivers are openly conveyed and evaluated. The dismissing (Type A) category is reflected in the CAI as discrepancies between generalized positive descriptions and episodic examples aim at explaining the positive descriptions, i.e. idealizations, and/or through minimizing of affective content and vulnerability. The preoccupied (Type C) category is characterized by unbalanced emotional activation, and attempts to involve the interviewer in a coalition against the parents. The disorganized category (Type D) is not classified based on the rating scales, but instead on specific markers present in the interview, such as dramatic shifts in affective display, long inappropriate pauses, bizarre content etc (Shmueli-Goetz et al., 2004). The disorganized category is supplementary to the other organized categories. For instance, a child may be classified as disorganized dismissing.

Shmulei-Goetz and colleagues (Shmueli-Goetz et al., 2008; Target et al., 2003) have shown inter-rater reliability with a median IntraClass Correlation (ICC) for three coders of 0.88 (ranging from 0.71 to 0.94, except the subscale “idealisation of father” with an ICC of 0.38), and test-retest stability over three months, where the same child was re-interviewed by a different interviewer, but with the same coder, with a median of  $r = 0.63$  (ranging from 0.55 to 0.90, except the subscales “preoccupied anger with father” with an  $r$  of 0.29, and “idealization of father” with an  $r$  of 0.42). In spite of the CAI-ratings being based on the child’s



verbal response, neither verbal IQ score nor expressive language score was related to attachment classification (Target et al., 2003).

The CAI is scored by trained coders who have attended a five day course at the Anna Freud Centre, London. The coder must also have passed a test of inter-rater agreement with a standardized set of 30 interviews within 80 % agreement on the four categories described above (secure, dismissing, preoccupied, and disorganized).

The interviews in this study were coded by Heidi Jacobsen, Cand. Psychol, and me. We are both certified coders by the Anna Freud Centre. Because of initial problems with inter rater reliability, in particular on the subscales, we found it necessary to supplement criteria for rating some of the subscales. This is because we found the manual (Shmueli-Goetz et al., 2004) to be unspecific and inconsistent at some points. This work was based on our separate coding of approximately 20 interviews, and was done by discussing rating-by-rating in cases where we disagreed. These supplements were mainly specifications of anchor point ratings, incorporated from other parts of the manual into the scoring criteria for each subscale. The supplements were approved by M. Target and P. Fonagy at the Anna Freud Centre, London. Details about the supplement can be obtained on request.

Based on the manual with these supplements incorporated, we coded 52 interviews separately to ensure inter rater agreement. For the four attachment categories (Secure, Dismissing, Preoccupied, and Disorganized), the inter-rater agreement for the categories was 82% for mother and 78% for father. Inter-rater agreement for the subscales was calculated according to the Spearman-Brown formula: Emotional openness: 0.90, Balance: 0.80, use of examples: 0.92, Preoccupied anger with mother: 0.97, Preoccupied anger with father: 0.92, Idealization with mother: 0.70, Idealization with father: 0.79, Dismissal of mother: 0.83, Dismissal of father: 0.86, Resolution of conflicts: 0.88, and Overall coherence: 0.91.

#### 2.2.2. Mental health problems – parent report (Papers 2 and 3)

Parents reported their child's mental health using the 25-item *Strength and Difficulties Questionnaire* (SDQ; e.g. Goodman, 2001, see [www.sdqinfo.com](http://www.sdqinfo.com)), a questionnaire widely used both in the Nordic countries (Obel et al., 2004), in the US (Palmeri & Smith, 2007; Bourdon et al., 2005), and elsewhere (Goodman et al., 2000a). The parent report version of the SDQ can be administered to parents of four to 16-year-olds. It is designed to measure four dimensions of mental health problems, each consisting of five items; emotional problems (a

combination of anxiety and depression), conduct problems, hyperactivity-inattention, and peer problems, and in addition one prosocial dimension measuring the child's social resources. Each item is rated on a three-point Likert scale. The SDQ has been found to have good case-finding abilities in the normal population (Goodman et al., 2000b), and correlates highly with Achenbach's (1985) Child Behavior Checklist (Goodman & Scott, 1999). Even though the SDQ has repeatedly proven adequate as screening for child and adolescent mental health problems, recent studies examining its factor structure have questioned the validity of the original five dimensions (Koskelainen et al., 2001). In particular studies using Confirmatory Factor Analysis (CFA) have yielded inconsistent results (Mellor & Stokes, 2007; Palmeri & Smith, 2007; Dickey & Blumberg, 2004; Ronning et al., 2004). For instance, Palmieri and Smith (2007) found support for a five factor model, whereas other studies have not found adequate fit for the hypothesized model (Mellor & Stokes, 2007). Of particular relevance for paper two, Dickey and Blumberg (2004) found parent reported conduct problems and hyperactivity-inattention to be a unidimensional measure of externalizing problems rather than two distinct dimensions. This finding resembles the ones by Koskelainen and colleagues (Koskelainen et al., 2001) using exploratory factor analysis. For the purpose of paper two, I compared the original model (conduct problems and hyperactivity-inattention as separate factors) with a one factor model (externalizing problems), using Mplus (Muthen & Muthen, 2006). An example of an item measuring conduct problems is: "Often loses temper"; and an example of an item measuring hyperactivity-inattention is: "Restless, overactive, cannot stay still for long". Initial screening of the data revealed that one item on the conduct scale (steals) had zero variance, and this item was therefore deleted from the analyses. Neither the two factors fitted the data adequately (Conduct problems: CFI/TLI, .76/.27; RMSEA, .19, hyperactivity-inattention: CFI/TLI, .91/.83, RMSEA, .10). The externalizing problem factor comprising all items of the two scales (except the item about stealing which was deleted), yielded acceptable fit (CFI/TLI, .92/.88, RMSEA, .065) after allowing two correlations between error terms (obeys with tantrum and fidgety with restless). Even though not optimal, this composite scale represents a unidimensional measure of externalizing problems which adequately fits the data, and is therefore used further in this study. The original five-item emotional problems subscale yielded moderate fit after allowing correlation between two items (afraid with clingy; CFI/TLI, .96/.91, RMSEA, .074). An example of an item from the emotional problems subscale is "Many worries or often seems worried". Also not optimal, this scale represents a unidimensional measure of internalizing problems. Mean scores are

generated for both the composite externalizing scale (Cronbach's  $\alpha = .74$ ) and the internalizing/emotional problems scale (Cronbach's  $\alpha = .68$ ).

### 2.2.3. Parenting styles – parent report (Paper 2)

*The Parental Authority Questionnaire* (PAQ; Buri, 1991) measures the three parenting styles described by Baumrind (1966) Authoritative, authoritarian, and permissive. The subscale measuring authoritative parenting was not part of the hypotheses and will not be described further. The PAQ was originally designed to measure how adults and adolescents described their parents' attitudes retrospectively (Buri, 1991). Buri (1989) also suggested a version where the items were reworded to reflect parent's current attitudes towards parenting, and this was initially done by Smetana (1995). A slightly revised version of the parent report version of the PAQ was further validated by Reitman and colleagues (2001), who found acceptable factor structure, internal consistency, and expected correlations with other parenting scales.

The PAQ consists of 30 statements, reflecting authoritative, authoritarian, and permissive parenting (each by 10 statements), and is rated by parents on a five-point Likert scale, ranging from "strongly disagree" to "strongly agree". An example of an item measuring authoritarian parenting is: "I let my children know what behavior is expected and if they don't follow the rules they get punished". An example of an item measuring Permissive parenting is: "My children do not need to obey rules simply because people in authority have told them to". Factor analyses in our data supported the three-factor model originally proposed by Buri (1991), and the Cronbach's  $\alpha$  were for Authoritarian .71, and Permissive .69.

### 2.2.4. Temperament – parent report (Paper 3)

Temperament was assessed by three dimensions of the *EAS Temperament Survey for Children* (Buss & Plomin, 1984). Each dimension, emotionality, shyness and activity, is measured by five items describing behavioral characteristics. These are rated by the parents on a five-point Likert scale ranging from one (not typical) to five (very typical). The subscales included in paper three are *emotionality*, *shyness* and *activity*. Examples of items are for emotionality: "cries easily"; for shyness: "tends to be shy"; and for activity level: "is always on the go". The factor structure, reliability and stability of the EAS have previously been found

to be satisfying in a Norwegian sample (Mathiesen & Tambs, 1999). The responses were summarized into a mean score, and Crohnbach's alphas for the five-item temperament subscales *emotionality*, *shyness* and *activity* were .81, .66, and .75, respectively.

#### 2.2.5. Adverse family experiences – parent report (Papers 2 and 3)

Adverse family experiences was reported by the parents using the 14 item version of the *Family Adversity Index* (Mathiesen & Sanson, 2000), addressing experiences during the last year of housing and employment problems, partner problems, substance abuse problems in the family, problems in relation to care giving responsibility and child rearing, and other problems. For instance: "Housing problems (maintenance, rental, or other things)". Each item is rated on a four point Likert scale, ranging from "not demanding", rates as 1, to "very demanding", rated as 4. One composite mean score was generated from these items. Because Adverse family experiences is a composite, not a latent variable, Crohnbach alphas were not calculated.

#### 2.2.6. Economic hardship – child report (Paper 3)

Economic hardship was reported by the children on four items from the Adolescent Perceptions of Family Hardship scale (Conger et al., 1999). The children report the extent to which they experience economical shortage in the family, and each item is rated on a four- (two questions) and five- (two questions) point Likert scale. An example of an item is: "How much of a problem does your family have because your parents do not have enough money to buy things your family needs or wants?". In accordance with Conger and colleagues, we consider the experience of economic hardship to be a latent variable. The responses were summarized into a mean score, and the Crohnbach's alpha was .57.

#### 2.2.7. Adverse family and school experiences – child report

Children's report of adverse family and school experiences was indexed with an extended version of the *Daily Hassles Checklist* (Oppedal & Røysamb, 2004), based on the work of Rowlison and Felner (1988). The index focuses on adverse experiences during the last year. Eight items address adverse experiences in the family, for instance "I often hear my parents argue". Five items address adverse experiences in school, for instance "I have problems in

relation to one or more teachers”, and one item is related to friends. Each item was rated on a four point Likert scale ranging from “No, never”, rated as 1 to “Yes, very often”, rated as 4. One composite mean score was generated from these items. Because Adverse family experiences is a composite, not a latent variable, Crohnbach alphas were not calculated.

#### 2.2.8. Supportive peer and classmate relationships – child report

Children’s report of supportive peer and classmate relationships was indexed with two separate scales adapted from Oppedal and Røysamb (2004), based on work by Cohen and Willis (1985) and Ystgaard (1997). Examples of items are, for supportive classmates “I have much in common with others in my class”; and for supportive peers “I can account on support from my Norwegian friends when I need help”. (A similar question addressing immigrant friends was also given in a separate scale. This scale was not included here, because the two were highly correlated and the second was therefore redundant.) Items on both scales were rated on a five-point Likert scale ranging from completely agree, to completely disagree. The Crohnbach’s alphas were for supportive classmates .84, and for supportive peers .80.

### 3. Methods and statistics

#### 3.1. CFA

The first paper in this dissertation is an application of Confirmatory Factor Analyses (CFA; e.g. Bollen, 1989) to the study of construct validity. I discussed the conceptual part of validation studies with CFA above, and will restrict this section to discuss some more technical issues about CFA. From a conceptual point of view, CFA is part of the group of factor analyses. Common to all factor analysis is the assumption that there is one or more unobserved (latent) variables, explaining the covariation among observed variables (factor indicators), for instance items in a test (Fabrigar et al., 1999). Thus, the methods are based on the assumption that each factor indicator consists of a true score, which is attributable to the latent variable, and an error score, which is unrelated to the latent variable. In contrast, methods for data reduction (principal component analysis and formative CFA) assume no error score in the indicators (Fabrigar et al., 1999). CFA differs from Exploratory Factor Analysis (EFA) in important ways. The purpose of an EFA is to arrive at the most parsimonious set of latent variables explaining a substantial amount of covariation among the measured variables. Thus, EFA is a theory-generating statistical test (Fabrigar et al., 1999). In

contrast, CFA is hypothesis-testing (Kline, 2005). CFA is a fundamental part of Structural Equation Modeling (SEM), where it is often termed measurement model. SEM is a statistical comparison of a pre specified theoretical model of the relationships in the data, with a variance and covariance matrix of the observed data (Bollen, 1989). Fit-indexes indicate the degree of fit between the hypothesized and the actual variance and covariance in the data, and is a vital for evaluating the adequacy of the model. Whereas a large number of different fit-indexes exist, we report four of the most common. The first of these is the chi-square statistic. This is a test of the discrepancy between the model and the data and should therefore ideally be insignificant, i.e. significant difference means bad fit (Kline, 2005). However, the chi-square may be significant even in adequately fitted models, and is seldom relied on as a definite index of fit (Kline, 2005). A less rigid interpretation is that the chi-square value should be less than twice the degrees of freedom in the model (Hagtvet, personal communication, March 2006). The Comparative Fit Index (CFI) and the Tucker-Lewis Fit Index (TLI) compare a baseline model, with zero covariance among the indicators, with the model specified by the researcher (Kline, 2005). CFI and TFI values above 0.9 indicate adequate model fit, whereas values above 0.95 indicate good model fit (Hu & Bentler, 1999). The most commonly used fit index in addition to the chi-square is the Root-Mean-Square Error of Approximation (RMSEA), which indicates the degree of error in the researcher's model, but adjusts for sample size. Furthermore, the RMSEA favors more parsimonious models (Kline, 2005). RMSEA values below 0.08 indicate adequate fit, whereas values below 0.06 indicate good model fit (Hu & Bentler, 1999).

A strength of the SEM-paradigm, including CFA, is that it forces the researcher to decisions at all steps of the process and at the same time provides means for specifying the model and the analyses to reflect important theoretical nuances. The most important part of this is the theoretically driven specification of the model to be tested. Yet, other aspects of the analysis must also be carefully considered. Thus, the use of SEM is to a great extent to include all steps of thinking in the research process into the statistical analysis.

### 3.2. *Moderators tested with interaction terms*

Both paper two and paper three are based on multiple Ordinary Least Squares (OLS) regression analyses testing linear effects as well as moderator effects. In its classical form, a moderator is a variable which “affects the direction and/or strength of the relation between an

independent or predictor variable and a dependent or criterion variable” (Baron & Kenny, 1986, p. 1174). Put another way, the effect of the predictor on the outcome shifts, depending on the values of the moderator variable (Dearing & Hamilton, 2006). This is exemplified in attachment research by the diathesis-stress model, where attachment security moderates the effect of stress on mental health outcome. In other words, the effect of stress on mental health outcomes depends on the attachment status. Moderator effects are most commonly tested as interaction terms in a multiple OLS regression as a significant effect of the product of a predictor and a moderator on the outcome (Baron & Kenny, 1986; Dearing & Hamilton, 2006).

A further step in testing moderator effects is to examine regions of significance (Dearing & Hamilton, 2006). This identifies the range of the moderator variable on which the association between the predictor and the outcome is significant, or regions of the predictor variable where the moderator variable has an effect on the association with the outcome. Regions of significance can be estimated using Preacher and colleagues’ (2006) web-based calculator.

A caveat in this approach to testing moderators concerns the directionality of the effect. The classical approach to testing moderator effects with interaction terms is in fact bi-directional. From a statistical point of view, the interaction effects in paper two could justifiably be interpreted as if family adversity moderates the effect of attachment on externalizing problems. Thus, what is termed moderator and what is termed predictor is only a matter of taste and theory. The problem of directionality has been addressed by Kraemer and colleagues (2001) who suggest the following “strict” definition of moderation: The moderator precedes the predictor, the moderator and predictor are not correlated, and the moderator and predictor codominate (the predictor and the moderator explains substantially more of the outcome than either of them alone). It is important to note that none of these criteria are completely fulfilled in this dissertation. Rather, Kraemer and colleagues would call this “overlapping risk factors” (Kraemer et al., 2001)

## 4. Results

### 4.1. *Summary of paper 1*

#### FACTOR STRUCTURE OF THE CHILD ATTACHMENT INTERVIEW

The aim of this study is to specify and test the factor structure of the recently developed Child Attachment Interview (CAI; Shmueli-Goetz et al., 2008), by means of Confirmatory Factor Analysis (CFA; e.g. Bollen, 1989). The advantage of supplementing traditional attachment categories with a continuous score of attachment security has been discussed by several authors (e.g. Cummings, 1990; Kobak, et al, 1993; Fraley & Spieker, 2003). We suggest CFA as a useful approach both to provide a continuous measure of attachment based on the subscales of the CAI, and to examine the construct validity of this measure. A CFA model of the attachment construct should “translate” the characteristics of the secure, dismissing and preoccupied category into a dimensional system. Based on previous work on dimensional approaches to the attachment construct, we hypothesize one dimension varying from security to dismissal, and one dimension varying from preoccupation to dismissal (including idealization).

Analyses included 150 children aged 9-13, recruited from schools in Norway. Adequate model fit was found for the one factor model Security-Dissmissal ( $\chi^2 [18] = 29.57$ ,  $p = 0.042$ ,  $TLI = 0.98$ ,  $CFI = 0.99$ ,  $RMSEA = 0.065$ ), as well as for the two factor model where the Security-Dissmissal factor was supplemented with the modified factor Preoccupation-Idalization ( $\chi^2 [4] = 8.13$ ,  $p=0.09$ ,  $TLI = 0.95$ ,  $CFI = 0.95$ ,  $RMSEA = 0.083$ ). Individuals' scores based on these factors converged with the categorical attachment classifications, but added more subtle information about individual differences.

Our findings support the use of CFA as a way to approach CAI as a continuous measure of attachment in middle childhood, and the construct validity of this approach. Together with the findings of Shmueli-Goetz and colleagues (Shmueli-Goetz et al., 2008; Target et al., 2003), these findings offer increased evidence for the CAI as a measure of attachment in middle childhood.



#### 4.2. *Summary of paper 2*

##### ATTACHMENT AS A MODERATOR OF FAMILY RISKS IN LATE CHILDHOOD

The age span from 8 to 13 years is the least studied age period in attachment research, and studies of attachment and mental health problems in this age period are almost absent. Based on a stress-regulatory approach to attachment (Bowlby, 1969), we hypothesize that children with insecure attachment representations have more mental health problems than children with secure attachment representations (measured with the Child Attachment Interview, Shmueli-Goetz et al., 2008, and conceptualized as a unidimensional continuum equivalent with the Security-Dismissal factor from paper one), when they experience family risks. Family risks are conceptualized as ineffective parenting and family adversity, building on Greenberg's (1999) model of attachment as part of a multi variate risk factor model. Specifically, we hypothesize a moderating effect of attachment security on the association between each of the indicators of these two risk domains and mental health problems (externalizing and internalizing). Furthermore, we hypothesize a moderating effect of attachment security on the association between a cumulative index of risk factors and mental health problems.

This study is cross sectional, including a community sample of 118 children, aged 9-13 years, and at least one of their parents. Several attachment×risk interactions indicated lower levels of mental health problems among children with secure versus insecure attachment, when exposed to family risks. With regard to externalizing problems, the risk factors interacting with attachment were authoritarian parenting, and child and parent report of family adversity. With regard to internalizing problems, the risk factors interacting with attachment were permissive parenting and parental report of family adversity. The regions of the risk factor where the interaction was significant varied considerably (from low to high levels of risk), depending on the risk factor. Further, the interactions attachment×cumulative index family risks were significant with regard to both externalizing and internalizing problems in a dose-response manner. This indicates that the larger number of family risks, the greater the impact on the mental health status of children with insecure attachment, but not on children with secure attachment. The findings imply that attachment security may influence the way in which children in this age group experience a potentially stressful family and school context.

#### 4.3. Summary of paper 3

### ATTACHMENT AND INTERNALIZING PROBLEMS IN LATE CHILDHOOD: EXPLORING DEVIATIONS

Bowlby (1973) underscored the non-linear and probabilistic link between attachment and mental health problems. Yet, studies have primarily addressed models of associations between insecure attachment and mental health problems. Inspired by resilience research, we focus on children who have more or less internalizing problems than would be expected from their level attachment security. The developmental era we examine is late childhood, in which attachment is measured with the Child Attachment Interview (CAI; Shmueli-Goetz et al., 2008), and conceptualized uni-dimensionally as the Security-Dismissal factor from paper 1. We draw on three sources of relevance as risk or protective factors for internalizing problems: *temperament, family risks, and social support from the peer group*. We adapt a methodological approach from resilience research (Kim-Cohen et.al, 2004), using the standardized residuals from a regression model predicting internalizing problems from attachment security (deviation score). Children with a positive deviation score are then doing better with regard to the outcome than would be expected given the level of attachment security, whereas children with a negative deviation score do worse than expected. These residuals are used as dependent variables in further multiple regression analyses.

This study is cross sectional, including a community sample of 118 children, aged 9-13 years, and at least one of their parents. Attachment security accounted for 9.6% of the variance in internalizing problems ( $\text{Beta} = 0.31, p < .001$ ). Results revealed that high levels of negative temperament (negative emotionality and shyness) and family risks (economic hardship and family adversity), as well as an interaction between these variables, explained more internalizing problems than expected given the child's level of attachment security. However, positive temperament (activity) and social support from peers did not explain less internalizing problems than expected, given the child's level of attachment security. We suggest that attachment security may be of varying importance as protective factor for children experiencing stress, depending on temperamental factors.

#### 4.4. Supplementary results

For the purpose of the dissertation, I add analyses of the relationship between the Security-Dismissal factor score and internalizing problems, as well as the factor score as a moderator of the association between family adversity and internalizing problems. By this, I can demonstrate how a continuous approach to individual differences in attachment, compared to a categorical, adds to our understanding of the relationship between attachment and external criteria, like internalizing problems, as well as to a diathesis-stress model including attachment. Figure 4.1. illustrates a dose-response trend in the association between attachment and internalizing problems. The figure also compares the information about the relationship between internalizing problems and a secure-insecure categorization. In order to test the adequacy of this dose-response interpretation, we performed a non-linear regression model to examine whether any non-linear relationship in the data associated with thresholds, i.e. categories, explained more variance than a linear model. Neither logarithmic, growth, exponential, nor quadratic models did so. We therefore conclude that the relationship between attachment security and internalizing problems is most adequately described as a linear one.

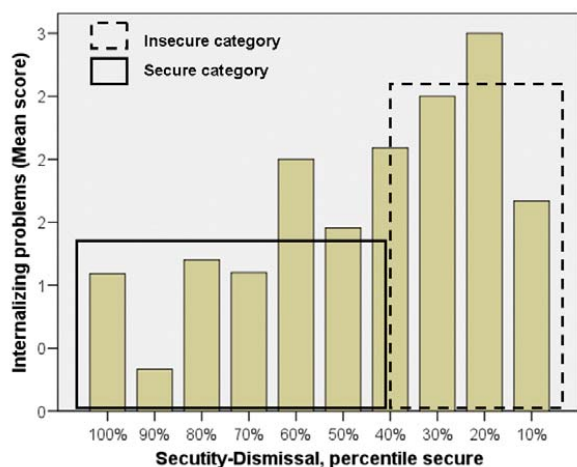


Figure 4.1. Comparison of the mean level of internalizing problems in relation to attachment security conceived categorically (boxes with dotted and solid line) and continuously. The Security-Dismissal axis presents level of attachment security in terms of 10<sup>th</sup> percentiles (10% means the 10% with the lowest level of security).

There is a similar dose-response trend in a diathesis-stress model where attachment moderates the association between family adversity and internalizing problems, as described in paper two. This is illustrated in Figure 4.2. The main pattern in this graph is that the level of family adversity is not associated with internalizing problems for children with high levels of security. When the level of family adversity increases, levels of internalizing problems increase gradually with decreasing levels

of security (i.e. insecurity). Notably, there are only six children in each bar, and some of the bars therefore deviate from this main pattern.

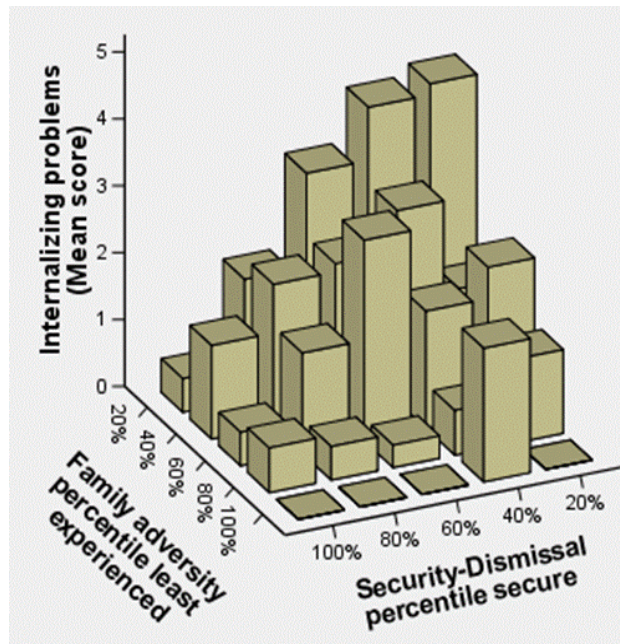


Figure 4.2. The dose-response moderating effect of attachment security on the association between level of family adversity and internalizing problems (see paper two for details about analysis). The Security-Dismissal axis presents level of attachment security in terms of 20<sup>th</sup> percentiles (20% means the 20% with the lowest level of security). The Family adversity axis presents level of parent reported experienced family adversity in terms 20<sup>th</sup> percentiles (20% means the 20% with most family adversity).

## 5. Discussion

This doctoral project was designed to explore three topics: Does the measurement of attachment in middle childhood actually reflect the attachment construct? What is the role of attachment in more complex models of risk and mental health problems? How should we understand children who have more or less internalizing problems than expected, given their level of attachment security? Each of them has been addressed in one article.

The first paper in the dissertation was an examination of the construct validity of the recently developed Child Attachment Interview (CAI; Shmueli-Goetz et al., 2008; Target et al., 2003). This examination took an unconventional approach by addressing individual differences in attachment as continuously structured, within a latent variable framework. The main finding was that a one-dimensional as well as a two-dimensional model, consistent with theoretical considerations about individual differences in attachment, fitted the data adequately. Furthermore, this two dimensional model took care of the information inherent in the attachment categories, but added nuances about more subtle differences.

The second paper is an examination of the relation between attachment and family risk factors in the prediction of mental health problems in middle childhood. The main finding was that high levels of attachment security buffered the negative effects of individual family risk factors, as well as a cumulative index of family risks.

The third paper was an exploration of deviations from the theoretically predicted association between attachment and internalizing problems. We found high levels of difficult temperament (negative emotionality and shyness) and family risks (economic hardship and family adversity), as well as an interaction between these variables, to explain more internalizing problems than expected given the child's level of attachment security. Low levels of difficult temperament and family risks, but not positive temperament (activity) and social support from peers, explained less internalizing problems than expected, given the child's level of attachment security.

### 5.1. *Methodological issues*

#### 5.1.1. Reliability

Reliability refers to the consistence of a measurement procedure (John & Benet-Martinez, 2000), and is in its classical form defined as the variance of the true score divided by the variance of the observed score (Lord & Novick, 1968). In this dissertation, three different

approaches are taken to address reliability, two of these with regard to the CAI. The first is to examine inter-rater agreement, which is the conventional approach in attachment research. We examined agreement for each subscale in addition to main classification for 52 of the 150 interviews. Spearman Brown inter-rater agreement for the subscales ranged from 0.97 to 0.70 with a median of 0.88. The Spearman Brown formula is an adjustment of a Pearson correlation, as the latter often underestimates the true inter rater agreement (Fleenor et al., 1996). The inter-rater agreement on each subscale was used as an indication of the amount of error variance, but we did not adjust any estimate for this. All analyses are based on my ratings of the entire sample. For paper one, we applied a similar strategy using my classifications of the attachment categories. I conducted an informal review of publications in leading journals using other attachment measures, and found no consistent conventions in attachment research either for the proportion of the data to be double-coded, or for the amount of disagreement between raters accepted (e.g. Roisman et al., 2006; Moss et al., 2004; Marsh et al., 2003).

A second step with regard to reliability of the CAI was taken when we used the factor scores. In paper one, the factor loadings (median value .75) indicate that there is moderate amounts of error variance in most of the subscales. Furthermore, in papers two and three, we apply a factor score as a continuous variable. Although factor scores are not free of measurement error (Bollen, 1989), they can be considered weighted sum scores, and represent better estimates of the true score than simple sum-scores.

The other measures included in this study are scales from questionnaires, of which a mean score was included in the analyses. Reliability of these scales, in terms of the amount of true variance in a sum score, was estimated in conventional manner with Cronbach's alpha, which is the mean reliability computed from all split halves of the test (John & Benet-Martinez, 2000). The alpha's in this dissertation range from .57 to .81. Although conventions suggest that scales with alphas below .70 are considered unreliable, recent considerations of the alpha take into the account that it is a product of inter item correlation as well as number of items included (John & Benet-Martinez, 2000; Cronbach, 2004). It is therefore common to accept lower alpha values, in particular for short scales.

### 5.1.2. Generalizability

Generalizability refers to the extent to which we can make inferences of our findings to a broader population (Shadish et al., 2002). In this study, we invited participants from 5 public schools in Bergen, but want ideally to generalize our findings to all children in this age group, at least to those living in a similar culture (van de Vijver & Leung, 1997). As noted in the methods section, there was a moderately high response rate all over (67 %), yet a low response rate for that part of the study involving the CAI (27 %). This represents a serious threat to the generalizability of our findings (Rothman, 2002). There was a higher proportion of girls and of immigrant children who participated in the interview compared to the main study. We attempted to control for this attrition by adjusting the analyses for these and other demographic variables. Yet, based on findings involving the same target population, the mean score for both internalizing and externalizing problems in our study was lower than in the target population at large (Stormark et al., 2008). Furthermore, we must expect that non-respondents had a somewhat higher level of mental health problems than respondents (Stormark et al., 2008).

There are, however, indices in our data suggesting a degree of generalizability across populations. The distribution of attachment patterns found in our sample comprises sixty percent secure and forty percent insecure, mainly dismissing. Interestingly, this is almost identical with the distribution found by Shmueli-Goetz, et al. (2008) in their sample of British children from the normal population. This distribution also resembles data from a meta-analysis of AAI distributions from the normal population ( $n=2000$ ), where the secure group comprised 58 % whereas 24 % were classified as dismissing and 18 % as preoccupied (van Ijzendoorn & Bakermans-Kranenburg, 1996). The distribution of sixty percent secure and forty percent insecure seems quite robust in the normal population, and is also found in our sample.

Generalizations of relationships between variables may be less vulnerable to attrition than estimates of prevalence (Aaberge & Laake, 1984). In fact, several effect sizes are comparable to other studies. For instance, the correlation between attachment security and internalizing problems in this sample is  $r = -.30$ , which resembles other findings (Graham & Easterbrooks, 2000; Allen et al., 1998). Externalizing problems were less strongly correlated with attachment security ( $r = -.15$ ), yet comparable to some other studies (Moss et al., 1998; Allen et al., 2007). Moreover, the association between authoritarian parenting and attachment was similar to a finding by Allen and colleagues (1998).

Although the distributions of attachment patterns as well as some associations are similar across some populations and cultures, it does not necessarily mean that our findings can be generalized. The cross cultural generalizability of attachment theory has been heavily debated, in particular whether attachment security is normative in all cultures, and also whether it is equally beneficial in all cultures (e.g. van Ijzendoorn & Sagi, 1999; Rothbaum et al., 2000; Crittenden & Claussen, 2000). From a methodological point of view, measurement across cultures is a challenge (van de Vijver & Leung, 1997), and comparisons of prevalence across cultures requires a highly specialized methodological procedure (Gregorich, 2006).

#### 5.1.3. Source bias and informant discrepancy

Each method and approach to measurement, for instance the use of a questionnaire, is contaminated with error specifically related to that particular method (Shadish et al., 2002). This is a general concern in research measuring one phenomenon with one method. More seriously, the findings in paper two and three are contaminated by the fact that some risk factors as well as the outcome are reported by one parent. It is therefore likely that there is some shared variance between measures which is attributable to the fact that the same person reported on both. In particular, it may be hypothesized that parents with authoritarian parenting values are less tolerant of externalizing child behavior, and that this may inflate the association. This can however not explain all of the association since the effect was different for children with secure versus insecure attachment representations.

An opposite challenge is the interpretation of multiple informants on one phenomenon, for instance the reports by both parents and children on experiences of family adversity in paper two. The items addressing this topic are different for parents and children. Yet it is notably that the two are unrelated, also as predictors of mental health problems. However, although I have been unable to identify studies comparing parent and child reports on family environment, this informant discrepancy is in accordance with most other studies comparing parent and child ratings of child behavior (Achenbach et al., 1987). In this literature, there seem to be there seem to be agreement that discrepancies are due to uniquely different information as well as to reporter bias (e.g. Achenbach et al., 1987; Karver, 2006).



#### 5.1.4. Missing data

Missing data in both questionnaires and in the CAI represent a threat to the generalizability of the findings. The amount of missing values was below 5 %, except for a few respondents with extensive missing data. In general, I used the cut-off of 30 % missing as criterion for excluding subjects from the analyses. Data was Missing At Random (MAR), meaning missingness was unrelated to other observations in the data (Widaman, 2006). Missing data in the questionnaire was due to non-response by those who filled it out, whereas in the CAI missing data was due to too little information available for the coder to make a judgment. In spite of these different sources, missing data were treated in the same way in this dissertation, by means of an Expectation-Maximization procedure. This is a multiple imputation technique requires MAR, and provides a more robust estimate than listwise deletion or substitution of mean values (Widaman, 2006).

#### 5.1.5. Construct validity of the Child Attachment Interview

When addressing construct validity in this dissertation, I have relied on Messick's (1989; 1995) integrated view, suggesting that every new piece of research adds to making adequate interpretations of the meaning of a measure. Following this approach, I will evaluate the current status of the Child Attachment Interview, based on the validation studies by Shmueli-Goetz and colleagues (Shmueli-Goetz et al., 2008; Target et al., 2003), the results in this dissertation, as well as considerations done during my work with the CAI. However, I restrict the discussion to those aspects I consider most relevant based on available evidence; *the content aspect*, which I will discuss at some length, *the structural aspect*, and *the external aspect*. Furthermore, the generalizability aspect has been discussed above in its specific subchapter.

The content aspect concerns the extent to which the measure actually covers the measured construct. This concerns both whether the subscales cover all aspects of the attachment construct, and whether each subscale covers the sub-construct intended. First, Shmueli-Goetz and colleagues (Shmueli-Goetz et al., 2008; Target et al., 2003) provide a rationale for each of the subscales, grounding them in relevant research. Thus, the selection of the subscales is based on central aspects of attachment theory. However, they do not report any attempts to construct more subscales and select (either empirically or conceptually) among them, and the selection relies on the authors' expert judgment.

Although Shmueli-Goetz and colleagues (Shmueli-Goetz et al., 2008; Target et al., 2003) refer to behavioral subscales for rating the CAI, these were not available when my co-coder and I attended the course, and they are not described adequately in the versions of the manual we have used. The idea of behavioral subscales leaves however the question of *construct underrepresentation*, that there are important aspects of the attachment construct that are left uncovered by the discourse based coding. Further conceptual development of these subscales might reveal underrepresentation of the current coding system. The possibility of *construct-irrelevant variance* is addressed by Shmueli-Goetz and colleagues (Shmueli-Goetz et al., 2008; Target et al., 2003), through evidence for discriminant validity. Most importantly in this respect is the lack of association between attachment security and both verbal IQ and expressive language, supporting lack of construct irrelevant variance.

Second, at a more subtle level is the content relevance of each subscale of the CAI. I will here restrict my discussion to two subscales, which I have experienced as problematic; the dismissing and the preoccupied subscales. Dismissal, as it is covered by the coding manual, concerns all derogation-dismissal-deactivation; of affect where this would have been appropriate; of relationship with attachment figures; and of the attachment figures. From this list, it is obvious that this subscale covers a very broad specter of qualities. This scale may be an example where *construct-irrelevant variance* will occur. The subscale covers both derogation of the attachment relationship which is conceptually consistent with dismissal/deactivation, and derogation of attachment figures which is conceptually consistent with the involving anger tapped by the preoccupied subscale.

An opposite problem is apparent on the preoccupied subscale. According to the coding manual, this scale intends to measure involving anger. There is however reason to think about preoccupation in broader terms. For instance, Crittenden (1997b) has discussed appealing and involving seduction that serves the function of involving the interviewer in a coalition against the parents (a “poor me” quality), however without activating anger. The preoccupied subscale might therefore be considered somewhat *underrepresenting* the construct it intends to measure, and an extended discussion of this is needed.

Based on these considerations, the subscales measuring dismissal and preoccupation may be subjects for further development. The dismissing subscale may benefit from conceptual clarification, and possibly from differentiation into two or three subscales. One of these may even be related to the preoccupied category/dimension. The preoccupied subscale may benefit from more inclusive criteria, if passive and active aspects of preoccupation tend to co-occur,

or more likely by being supplemented with a subscale measuring the passive forms of preoccupation.

The structural aspect of construct validity refers to the extent to which the structure of the measure reflects the structure of the construct it is intended to measure. This topic is explicitly addressed in paper one, where we found evidence for the structural validity of a continuous approach to the attachment construct. Furthermore, the structural validity of the categorical approach to the attachment construct was addressed by Shmueli-Goetz and colleagues (Shmueli-Goetz et al., 2008), employing a Latent Class Analysis (LCA). Based on the subscale scores, they found evidence for three main latent classes reflecting the secure, dismissing, and preoccupied categories. Yet, 14 % of their sample did not fit in with these categories, and three additional latent classes were needed to achieve adequate model fit. Thus, although there is evidence for structural validity both of a continuous and a categorical approach to the CAI, more work is needed to interpret the meaning of this non-fitting subsample.

The external aspect of construct validity refers to convergent and discriminant validity as well as criterion relevance. Shmueli-Goetz and colleagues (2008) provided evidence for convergent validity in comparisons with the Separation Anxiety Test (Wright et al., 1995), mother's classification in the AAI (see Hesse, 1999, for review) and the Hampstead Child Adaptation Measure (Target et al., 2008). Examination of discriminant validity found the CAI, as mentioned, to be unrelated to demographic variables, verbal IQ and expressive language. Paper two in this dissertation added to the discriminant validity of the CAI by reporting low, yet significant association with authoritarian parenting, but insignificant association with both parent report of experienced family adversity as well as child report of experienced family and school adversity. These findings suggest that CAI measures a construct distinct from these other aspects of the family environment, and thereby add to the evidence of discriminant validity. Furthermore, the moderating effects found in paper two, of attachment on the association between family risks and mental health problems, add to this interpretation by demonstrating its unique role. Moreover, because the test of these moderating effects was theory driven, our findings also provide evidence for the criterion validity of the CAI.

When summarizing this evidence, it is useful to keep in mind the process-oriented manner in which Messick (1995), Keane (2001), and others conceive construct validation as *arguments for* a certain interpretation of the meaning of the test in a context. Arguably, further

work is needed in providing evidence for the adequacy of the preoccupied and dismissing subscales. Furthermore, as I will discuss below, disorganization is not covered by the subscales. In spite of these concerns, there is so far substantial evidence for interpreting the CAI as a measure of attachment. In particular, the findings in this dissertation provide arguments for considering the Security-Dismissal factor from paper one, applied as factor score in papers two and three, a meaningful uni-dimensional measure of attachment security in the normal population in this age group.

## 5.2. *Theoretical issues*

### 5.2.1. The dimensional approach to the attachment construct

The dimensional approach to the attachment construct is radically different from a categorical, by conceiving individual differences in terms of degrees, rather than kinds. The use of a continuous measure of attachment in mental health studies is by no means new (e.g. Marsh et al., 2003; Kobak et al., 1993). Yet, the factor analytic approach we suggest in paper one is in my view more comprehensive than previous work, because it draws on the entire coding manual in terms of using the subscales, as well as removes random measurement error. The need for approaches removing measurement error has been called for by Kobak and colleagues (2006). Even when used as factor scores in papers two and three, being weighted sum scores rather than latent factors, this approach represents a more adequate measure than a conventional sum score would have done. Still, the important question is: what did we gain in these studies by using the continuous approach compared to the traditional categories?

First and foremost, we gained a way of thinking about individual differences which is more nuanced than the categories, in accordance with previous thinking along this line (e.g. Marsh et al., 2003; Kobak et al., 1993b; Cummings, 2003). Cummings (2003) claims that the dimensional approach maintains the information provided by the categories, but adds information about subtle differences within the category. Paper one illustrated this point, by showing how variability in attachment is spread out, yet within the borders of the category. His related second point is that a continuous approach eliminates the risk of misclassification of cases on the borderline between categories. This problem is easily recognized from a coder's point of view, where our disagreements were mainly in cases rated between 4.5 and 5.5 on the nine-point scales, which is the border between secure and insecure. We almost never disagreed on categories in the more prototypical cases, those with most 7 or 8 ratings,

or 2 and 3 ratings. From a statistical point of view, Cummings' two points imply that the difference between two children with the factor scores 4.5 and 5.5, given a nine point scale, equals the one between two children with the factor scores 6 and 7.

The third point is that a dimensional approach provides a more nuanced understanding of the relationship between attachment and other phenomena. The categorical approach implies that the important information about relationships with other variables is between categories. In contrast, a dimensional approach implies that there is important information along the continuum as a whole. This is in fact an empirical question. If the relationship between attachment and an external criterion, say internalizing problems, was sufficiently described by the attachment categories, the level of internalizing problems should be unrelated to variability of attachment security within that category, and there should be a difference between the secure and insecure category in the level of internalizing problems. In contrast, if there is a dose-response relationship between internalizing problems and a continuous measure of attachment security, the continuum adds information about the relationship. This point was illustrated by Figure 4.1, presented as supplementary result in chapter 4. This graph showed that there is a clear difference in the mean level of internalizing problems between the attachment categories. Yet, this figure illustrated as a whole a marked dose-response relationship, which is concealed by the categories. It may be argued that there is little variability in the secure group with regard to internalizing problems. This does, however, indicate that if there was a border for the secure category, defined by its relation to internalizing problems, this would be from the 60<sup>th</sup> percentile of attachment and not include the lowest 10 percent of the secure group. Nonetheless, there is a convincing dose-response relationship within the insecure category.

The application of a continuous approach is of course easiest conceivable in cases where the continuum is uni-dimensional, as was mainly the case in our data. If the preoccupied pattern had been more prevalent, it would have been relevant to apply a two dimensional attachment measure. In principle, this would add even more nuances to our understanding of the role of attachment as a moderator, because we would conceive attachment in a two-dimensional field, as illustrated in Figure 4, paper one. Yet, addressing the research questions in this dissertation with a two-dimensional attachment construct would of course lead to more interaction effects in the model, compromising statistical power.

Limitations of a continuous approach to individual differences in attachment have been discussed (Cassidy, 2003; Sroufe, 2003). In particular, Sroufe (2003) raises an important

concern of relevance for our effort. He points to methodological challenges in creating adequate rating scales capturing all the nuances inherent in the categories, in particular with regard to dynamics in the strange situation. Instead, Sroufe relies on “clinical judgment” as necessary for this. This relates in an important way to implications of our factor analytic approach for coding of the CAI, since it relies completely on ratings of the subscales. As pointed out by Sroufe (2003), the complete reliance on the subscales removes the “clinical judgment” part of the current coding procedure. He claims this to be a necessary component of the coding, as he doubts all important aspects of attachment to be covered by the subscales. Fraley and Spieker (2003b) respond to this by arguing that the important variance in infant attachment most likely has been incorporated into the formalized part of the coding system by now. In principle, I think that the removal of “clinical judgment” from the coding is an advantage, given that the subscales comprise a consistent representation of the attachment construct. The current coding manual would, according to my preferences, benefit from a more precise description of the exact ratings. We incorporated examples of such precisions in the manual during our process of coding, described in the method section. Furthermore, removal of the “clinical judgment” would decrease the requirement for in-depth knowledge of attachment theory by the coder, and would probably increase reliability.

Another important limitation with the factor analytic approach taken here is that it only rests indirectly on evidence, from other age groups, that individual differences in attachment are continuously structured. Ideally, the taxonomic procedure should have been applied also in CAI data. However, this limitation applies to a categorical approach as well, as there is no evidence of the actual latent structure of CAI data. What I can state, based on our findings, is that given the assumption of a continuously structured phenomenon, the dimensions we propose comprise a fairly adequate representation of this.

#### 5.2.2. A tentative approach to the dimensionality of disorganization

Whereas the model we present in paper one focuses on the security, dismissal, and preoccupation, the disorganized category would be highly relevant to include in a dimensional model. At this point, disorganization in the CAI is, as mentioned, classified according to a check-list rather than rating scales. Interestingly, the original conceptualization of disorganization based on infant behavior in the Strange Situation, suggested a continuous measure reflecting the degree of intensity in which an infant displayed disorganized behavior

(Main & Solomon, 1990). A similar approach may be taken in the CAI, if the criteria for disorganization were made more explicit and also graded in the manual (Shmueli-Goetz et al., 2004). There may however also be other ways of viewing disorganization as a continuously distributed. Based a stress-regulatory approach, disorganization may be conceived as the response to an overwhelming level of stress (Crittenden, 1999). The level of stress a child is able to cope with in an organized way depends on the successfulness of the strategies used. Consequently, in attachment coding, the label is given to children who disorganize at the level of stress introduced by the interview. Hypothetically, children with more robust and effective strategies may also disorganize in situations with higher levels of stress (Crittenden, 1997a). One possible dimensional approach to disorganization may therefore address the level of stress a child can handle in a strategic way, i.e. a dimension ranging from easily to not-easily disorganized. The measurement of this dimension is however difficult, and may be restricted by ethical considerations.

Another approach to a dimensional understanding of disorganization is based on the speculative assumption that there is variability in the extent to which the organized attachment strategy serves a stress-regulatory function. This suggestion is inspired by Crittenden's (2000b) idea that adaptation, rather than security *pr. se.* is the important thing when it comes to attachment and mental health. Thus, one end of a hypothesized continuum of successfulness of the attachment strategy will be a robust ability to use the representations of attachment figures for stress regulation, whereas the other end of the continuum is disorganization. Again, these speculations are challenging to measure, but may be approachable through a combination of a discourse-based measure like the CAI and physiological measures of stress-responses. The distinct strategy applied will be revealed through the interview, whereas the stress-response may inform about its successfulness. Importantly, such a combination of measures must also incorporate the interplay between different biological and psychological systems for stress-response, and differential susceptibility to stress (Boyce & Ellis, 2005; Belsky et al., 2007), as will be discussed further below.

### 5.2.3. The role of attachment in relation to mental health

The second and third papers were different approaches to an examination of the meaning of attachment in relation to mental health problems. The second paper pursued a diathesis-stress

model. This is in itself not new, and previous studies in various age groups have found support for this approach (e.g. Belsky & Fearon, 2002; Graham & Easterbrooks, 2000; Marsh et al., 2003). I consider this to be the most consistent model for understanding how attachment relates to mental health. It is grounded in a basic tenet of attachment theory; the stress-regulatory function, as well as a broader understanding of how risk factors relate to mental health problems (Sroufe, 1997). It is intuitively easy to grasp and to apply, and it is easy to test. Furthermore, this model explains how attachment can be conceived to be of substantial importance for mental health, in spite of the small to moderate effect sizes of the main effect models. Attachment simply matters more for children with some degree of risk, and its main effect is therefore deflated compared to its effect where it matters the most.

The diathesis-stress model may be considered a relevant venue for the application of a continuous approach to the attachment construct, as it comprises a possibility for nuanced understanding of the graded interplay between attachment, risk, and mental health problems. The diathesis-stress model, in particular when integrated with a cumulative stress model, implies the idea that stress is not a ‘have or have not’ construct but a cumulative and dynamic one (Sroufe, 1997). Thus, in a model incorporating the dynamics of both the risk factors and the outcomes, a binary conceptualization of vulnerability as a ‘have or have not’ construct seems like an unnecessary restriction, unless the evidence for this binary structure is highly consistent. As discussed above, this is not the case with attachment, as the dose-response-relationship between attachment security and internalizing problems illustrated in figure 4.1 demonstrates. In figure 4.2., presented as supplementary results, I demonstrate that a similar dose-response relationship applies in a diathesis-stress model. High levels of family adversity increase the likelihood of internalizing problems more, the lower the level of attachment security. A dimensional understanding of attachment might therefore be the most theoretically as well statistically relevant approach to a diathesis-stress model.

Paper two supplements previous studies including the diathesis-stress model in several ways. First, it incorporated Greenberg’s (1999) cumulative risk factor domain model, as a theory driven multi-variate model of attachment, risk, and mental health. This adds to the work on Greenberg’s model both in terms of the age group and the outcome studied (middle and late childhood, and internalizing as well as externalizing problems), and by incorporating the diathesis-stress perspective in the model. Likewise, this study was the first to incorporate a theory driven multi-variate risk model with a diathesis-stress model of attachment. This study took into account the recommendations by Thompson and Raikes (2003), of combining



unique risk factors with cumulative indexes. The importance of this was underscored by our finding that attachment moderated the effect of some, but not all, family risk factors on mental health outcomes. The use of a cumulative risk index was a further advancement, as was illustrated by the dose-response effect of cumulative risk on both externalizing and internalizing problems, for children with high levels of insecurity only.

This latter finding strengthens the interpretation that attachment is at another conceptual level than the other risk factors in Greenberg's (1999) model, in relation to mental health outcomes. Whereas experiences of family adversity and ineffective parenting contribute to create a potentially stressful family environment, low levels of security make children more susceptible to this stress. This was explicitly stated by Barnett and Vondra (1999, p. 4.), asking whether attachment is "simply another marker of risk or can help explain the process that transform risk into psychopathology?". Based on the considerations in paper two, I think the answer is a tentative yes, however qualified by the limitations addressed in that paper and in the discussion of moderators above. It seems probable that attachment contributes to explaining why stress may lead to mental health problems. But of course, this is not the whole story, as we addressed in paper three.

In paper three, we explored characteristics of children doing better or worse with regard to internalizing problems than could be expected given their level of attachment security. These are deviations from what is a common expectation that children with high attachment security have less internalizing problems than children with low attachment security. This exploration was heavily inspired both by Crittenden's Dynamic-Maturational approach (2000b), and by evolutionary oriented attachment theorists (e.g. Simpson, 1999; Belsky, 1999; Hinde & Stevenson-Hinde, 1990). Common to these authors is the questioning of whether attachment security always is most beneficial. In spite of the repeated theoretical focus on this question, it had to my knowledge yet to be explicitly addressed in empirical studies. Our main finding in paper three was that children who have more internalizing problems than expected given their level of attachment security tend to have high levels of difficult temperament (negative emotionality and shyness) and family risks. Furthermore, the interaction of these risk factors, that is high levels of negative emotionality in the context of family risks, contributes to explain this deviation from the expected association.

The continuous approach to attachment provides a great advantage for the particular method applied in this study. In principle, a similar study could have been conducted by applying a cut-off on the internalizing continuum, yielding four quadrants comprising high

internalizing problems and secure attachment; high internalizing problems and insecure attachment etc. Yet, the dichotomization of variables to fit such a quadrant would decrease statistical power and conceal information, as described by MacCallum and colleagues (2002). As pointed out by Kim-Cohen and colleagues (2004), this continuous approach yields an individual value for each child. Similar to the cases illustrated in Figure 4.1., this provides us with an index of the degree of deviation from the expected associations, which is sensitive to the subtle individual differences in the deviation score.

The discussion in paper three contains some complementary post-hoc interpretations of these findings. Based on the idea of equifinality (different risk can lead to the same outcome; Cicchetti & Rogosch, 1996), we suggest that attachment security matters less for some children than others in relation to internalizing problems. This idea is inspired by evolutionary oriented theorists arguing that there are individual differences in the susceptibility to environmental influence (Belsky, 1997; 2005; Belsky et al., 2007), and that this is particularly important with regard to stress-regulatory processes (Boyce & Ellis, 2005). In other words, we hypothesize children with high levels of difficult temperament (negative emotionality and shyness) to have a temperamentally based, compare to attachment based, stress-regulatory system.

An alternative post-hoc explanation is based on the idea of multifinality (the same risk can lead to different outcomes; Cicchetti & Rogosch, 1996), that attachment security serves different functions for different children. This argument resembles the one presented in chapter 1.5.6., that secure attachment may be the most adaptive strategy in safe contexts, whereas insecurity may have adaptive benefits in contexts with higher levels of danger. Furthermore, in paper three, we synthesize these post-hoc hypotheses by suggesting that attachment security may be maladaptive for children with high levels of negative emotionality. This is because the secure strategy implies an open access to positive as well as negative affect. The combination of an attachment strategy which does not distort negative affective information (Crittenden, 1997b), with a high susceptibility to environmental influences, following the negative emotionality (Belsky, 1997), and a high level of stress, may lead to internalizing problems. As pointed out in paper three these post-hoc interpretations are speculative. However, they offer an alternative view to the main stream of attachment theory in attempting to specify conditions under which attachment security is of importance for mental health problems.

The second and third papers are different approaches to an examination of the meaning of attachment in relation to mental health problems. Broadly stated, the second paper concludes that attachment security is a benefit for children who experience family risks, whereas the third paper concludes that children with difficult temperament and family risks may have elevated levels of internalizing problems in spite of moderate to high levels of attachment security. Taken together, these findings point out that attachment acts differently and dynamically with various risk and protective factors<sup>3</sup>. First, it serves a moderating function, by being the “filter” through which a child experiences family stress. Children with high levels of security have an effective stress-regulatory system for dealing with stressful situations in the family. For instance, they may be able to integrate the good and bad aspects of their parents, and take their parent’s perspective (Fonagy et al., 2002). The otherwise stressful experiences in the family may be handled in a balanced manner. In contrast, children with low levels of security (i.e. insecurity), have less capacity for integrating good and bad aspects of their parents, because they idealize or dismiss what’s bad. They also avoid taking their parent’s perspective, as this makes idealization and dismissal more difficult. As long as this strategy works as a way to handle stress, it may be considered an adequate strategy. Yet, for children whose experiences of stress are too strong to handle with this strategy, mental health problems may be the result.

The “filter” through which the child experiences family risks, seems to be blurred by difficult temperament, in terms of negative emotionality and shyness. It may be interpreted from our findings that children with moderate levels of security, who have high levels of difficult temperament, are less capable of using their attachment representations as a means for affect-regulation. Thus, the “filter” function of attachment as a stress-regulatory system may not be the same for all children, and temperament may play a role in moderating the effect of the moderator.

#### 5.2.4. Contributions to the study of attachment in middle and late childhood

The aim of this dissertation was to add to the literature in one of the least studied age periods in attachment research – middle and late childhood – in several ways. Most of all, I think that we demonstrated that core attachment theoretical topics are generalizable from other age groups. This is contrary to the position taken by Raikes and Thompson (2005), who claim that attachment in middle and late childhood cannot be conceived as a downward

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<sup>3</sup> See appendix for a graphic illustration of how the results of paper two and paper three may be intergrated.

extension of adult attachment, or an upward extension of preschool attachment, but rather should be understood in terms of its own developmental characteristics. Whereas this is no doubt an essential topic for the development of adequate measures (e.g. Shmueli-Goetz et al., 2008), I will in the following justify that it is less so with regard to current challenges for attachment theory, such as validation and the role of attachment in mental health problems (Thompson & Raikes, 2003).

The conceptual foundation for the validation study in paper one is to a great extent based on studies from other age groups. Both the theoretically and the empirically derived models of attachment conceived as a continuously distributed phenomenon come from research on infants (Cummings, 1990; Fraley & Spieker, 2003a), and adults (Kobak et al., 1993; Roisman et al., 2007). The assumption that the structure of individual differences in attachment is isomorphic regardless of age group is in fact a basic assumption in traditional, categorical, conceptualizations of attachment (Main et al., 1985). Crittenden's (2000a) Dynamic-Maturational model is, to my knowledge, the only radical departure from this position. Although she maintains the basic tripartite categorization (ABC), she claims that development and maturation leads to development of more advanced and complex strategies within the broad dismissing and preoccupied categories. Taking this approach into account, there may of course be important developmental nuances that are not captured by the CAI categories or subscales. Alternatively, the broadening array of insecure strategies proposed by Crittenden (2000a) may be represented along our proposed continuum of attachment security. Nonetheless, it is important to note that a theoretically derived CFA model, specified on the basis of conceptualizations from other age groups, was found to fit the data adequately.

The application of a cumulative risk model is another point which seems to be generalizable across age groups. Whereas testing the diathesis-stress model was the purpose of paper two, we also tested the additive effect of three out of four domains in Greenberg's (1999) risk factor model (attachment, ineffective parenting, and family adversity). This additive model as a whole was predictive of both internalizing and externalizing problems, although the effects of the single risk factors were different. This supports Greenberg's (1999) proposal that the model would be adequate both in other age groups than preschool age where it was developed, and with regard to other mental health outcomes than externalizing problems for which it was developed.

The diathesis-stress model has also been found applicable across age groups. For instance, it has proven partially valid in preschool age (Belsky & Fearon, 2002), and been applied with

more success in early school age (Graham & Easterbrooks, 2000), and in adolescence (Marsh et al., 2003; McElhaney et al., 2006). In other words, the evidence is fairly consistent that in general, regardless of age, individuals with secure attachment do better than those with insecure attachment when exposed to stress.

These findings suggest that in many ways, the structure as well as the function of attachment is generalizable across age groups. There are however important exceptions. I have mentioned measurement. It seems obvious that a subtle understanding of general cognitive and emotional development, as well as of situations that activate and deactivate the attachment system is required to measure attachment in an adequate way. A surprising finding is that the lack of association between attachment and externalizing problems seems to be unique for this particular age group. In accordance with Moss and colleagues (1998) in their study of 7-9 year olds, and Allen and colleagues (2007) in their study of 13 year olds, attachment and externalizing problems are not directly associated in our study. Both of these studies are longitudinal, and find this association when their sample is younger (Moss et al., 1998) and older (Allen et al., 2007), respectively. This lack of association is contrary to studies of slightly younger children (Cohn, 1990; Solomon et al., 1995; Moss et al., 1996; Moss et al., 2004). Although difficult to explain, these findings suggest that there is indeed some uniqueness to the role of attachment in this age group, in spite of the many commonalities.

#### 5.2.5. Future directions

The findings in this dissertation point out directions for further research in both methodological and substantial domains. At the most general level, all three papers apply to a continuous approach to individual differences in attachment, both methodologically and conceptually. This may add to the existing literature as arguments for substituting or supplementing a categorical approach with a continuous in future research.

The application of CFA in the first paper points towards further use of this statistical approach for examining the latent structure of continuous approaches also to other attachment measures. However, the application of the CFA needs replication. As illustrated in the discussion of the factor structure of the SDQ (chapter 2.2.2.), there may be sample-to-sample variations in factor structures. These may apply across gender, across culture, and across other sample characteristics. In particular, a replication of our factor model in a sample with a substantial proportion of preoccupied attachment classifications is crucial to examine the

adequacy of the Preoccupation-Dismissal factor. Importantly, CFA provides a unique means for empirical testing of measurement invariance across samples or subsamples (Meredith & Teresi, 2006). Thus, comparison of samples within a CFA-framework is an important venue for further work. This would provide us with an opportunity to examine the generalizability of the latent structure of the attachment construct at a level of specificity not previously examined.

The use of CFA actualizes further development of the CAI coding manual (Shmueli-Goetz et al., 2004). In particular, it points to the necessity of highly specified instructions for the rating scales, in order to increase reliability as well as specificity of the ratings. This is acknowledged in the coding manual.

Paper two suggested a degree of success in integrating a theory-driven multi-variate risk factor model with a diathesis-stress model. Yet, far from all association between risk factors and mental health problems were moderated by attachment. A further examination of conditions under which attachment moderates risk would contribute to understanding the borders of attachment theory. Moreover, the examination of moderator effects was done in a cross sectional sample. An extension of this study into a longitudinal design with multiple measurement points would contribute to clarify the role of attachment as a moderator also according to the strict criteria of Kraemer and colleagues (2001). Such a design may also contribute to an examination of transactional effects between the various risk factors in the model (Sameroff & Mackenzie, 2003).

Paper three is an explorative study of the borders of attachment theory. I see two important topics to be addressed in further research. First of all, the approach should be replicated in samples at higher contextual risk and in samples with more variability in contextual risk, possibly also with a wider array of risk and protective factors examined. This would in particular add to our understanding of characteristics of children with *less* internalizing problems than expected, given their level of security, which was not illuminated at all by our study beyond low levels of negative temperament and family risks. However, extended understanding of children with more internalizing problems than expected is also needed. Application of the methodological approach to examine other predicted outcomes of attachment security would also be relevant, as would the application of this methodology to study other unexpected deviations within attachment theory, like for instance the “transmission gap” between parent’s and infant’s attachment classification, or the moderate association found between relational predictors (e.g. sensitivity) and attachment security.

Another point for future research would be stringent testing of the two hypothesized explanations of the findings in paper three, the equifinality and the multifinality explanations. This could for instance include a test of a differential susceptibility-hypothesis, following the methodological recommendations of Belsky and colleagues (2007). The final integrative model suggested in paper three, that attachment security may be maladaptive for children with high levels of temperament who also experience contextual risk, should also be subjected to further examination. The use of multiple methods, in particular combinations of latent variable models and person oriented models may be an adequate approach to expand the study of the borders of attachment theory.

## **6. Conclusions**

The aim of this doctoral dissertation was to contribute to attachment research, specifically in middle and late childhood, within the areas of measurement validation and attachment in relation to mental health.

Our findings from paper one supported the use of CFA as a way to approach CAI as a continuous measure of attachment in middle and late childhood, and the structural validity of this approach. We found a model consisting of a Security-Dismissal factor and a Preoccupation- Idealization factor to fit the data adequately, but suggested that a Security-Dismissal factor would represent an adequate uni-dimensional measure of attachment in these data. When comparing each individual's factor score and attachment classification, it was evident that the factors we specified maintained the information inherent in the attachment categories, but added information about more subtle nuances. This was exemplified by the demonstration of a dose-response relationship between the Security-Dismissal factor and internalizing problems in the supplementary results. Together with the highly relevant findings of Shmueli-Goetz and colleagues (Shmueli-Goetz et al., 2008; Target et al., 2003), these findings offer increased evidence for the CAI as a measure of attachment in middle childhood. Moreover, these results suggest that using CFA is a valuable venue for validation studies of interview-based attachment measures.

Paper two was among the first to examine attachment and mental health in middle and late childhood as part of a multi-variate risk model, and also among the first to examine a diathesis-stress model for attachment and mental health, both externalizing and internalizing problems, in this age period. Our main finding was that children with low levels of attachment security (i.e. insecure attachment) were at greater risk for both externalizing and internalizing

problems when exposed to ineffective parenting styles and to family adversity. This was also evident in a dose-response fashion to additive combinations of these risk factors, so that the more risk factors the children are exposed to, the more likely they are to have mental health problems if they have insecure attachment representations. In contrast, children with secure attachment representations seem able to buffer against the potentially ill effects of these risk factors. Furthermore, analyses revealed that the impact of attachment security as a moderator varies, from protecting children exposed to low levels of some risk factors, to high levels of other risk factors. In addition to demonstrate the protective effect of attachment security, this study demonstrated the importance of viewing different aspects of the family environment and family relationships as separate and only partially related domains.

The third paper was to our knowledge the first to systematically explore characteristics of children who deviate from the expected association between attachment and internalizing problems. Our main finding was that children with more internalizing problems than expected given their level of attachment security were characterized by high levels of difficult temperament (emotionality and shyness), as well as experiences of economic hardship and family adversity. Contrary to our expectations, positive temperament (activity) and supportive peer relationships and classmates did not contribute to explain less internalizing problems than expected, given the child's level of attachment security. Based on these findings, we suggested that attachment security may serve a differentially important function for children experiencing stress, depending on temperamental factors.

To summarize, attachment in middle childhood, measured with the Child Attachment Interview, can adequately be conceived as two dimensions. The most dominant of these dimensions, ranging from security to dismissal, moderates the association between family risk factors and internalizing and externalizing problems, by protecting children with high security. However, children with more internalizing problems than expected, given their level of attachment security, are characterized by high levels of negative temperament and family adversity, suggesting the protective effect of high attachment security do differ depending on temperamental factors.



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